# Findings and Lessons Learned from

# The Bungoma District Malaria Initiative

# 1998-2002

(Interim Working Report)

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# Executive Summary

The Bungoma District Malaria Initiative (BDMI) is a five-year pilot project (1998-2002) to improve maternal and child health and survival, especially by preventing and treating illness from malaria. Two integrated intervention strategies are being tested during the life of the project.

- Malaria prevention and treatment that combines several well-recognized measures. These measures include:
  - Early and effective treatment of fever in children under 5 by health workers and by caregivers in the home;
  - Preventing malaria infection in pregnancy by giving preventive drug treatment during women's antenatal care visits; and
  - Promoting the use of insecticide-treated bednets by children and pregnant women.
- Integrated Management of Childhood Illness (IMCI) that addresses the main childhood illnesses including malaria.

The design of BDMI includes a comprehensive approach to monitoring and evaluation that:[1]

- Defined indicators to assess the project's progress and impact;
- Gathered baseline information on the knowledge, attitudes, and practices of caretakers of children (usually mothers), health workers, traditional birth attendants, and drug distributors and vendors; and
- Is collecting follow-up information during the project's final year to assess changes in knowledge and practices related to malaria prevention and treatment and changes in morbidity and mortality from malaria.

The Kenyan partners implementing BDMI are the Kenya Ministry of Health, the Bungoma District Health Management Team (DHMT), and the African Medical and Research Foundation. The Centers for Disease Control and Prevention and the Quality Assurance Project (QAP), with funding from USAID, have been providing technical assistance to BDMI. Both USAID/Nairobi and USAID in Washington, D.C. have funded BDMI for a total of $5.8 million.

[1] Appendix 1 is a list of the 24 baseline and follow-up operations research studies that have been conducted since the start of BDMI in 1998.

While the effective starting date for BDMI was 1998, several baseline and follow-up studies had been undertaken beginning in 1994 to inform the project's design including a 1996 household survey of home treatment of children with fever, bednet use, and attendance at antenatal clinics. Based on the findings of this research, the project's interventions were developed in three areas:

- Case management of sick children
  - In health facilities
  - At home/community
- Management of malaria in pregnancy
- Use of insecticide-treated materials

Through the end of 2002, the project will be completing assessments and evaluations of the interventions. A number of important findings and lessons learned that have been collected to date are summarized here. Policy issues and related recommendations are also presented.

**Case Management of Sick Children in Health Facilities**

**Findings:**

❖ Gaps in the quality of care were similar in government and nongovernment facilities.

❖ The project staff found that orienting supervisors to IMCI is a continuing challenge. The Bungoma DHMT put considerable resources into training senior health facility staff in IMCI case management. It was reasoned that, as supervisors, senior staff needed to understand IMCI in order to support its implementation by junior staff. However, in several facilities, supervisors who had received orientation did not assign any of the IMCI-trained health workers to see sick children. Thus, part of the expense of IMCI training was wasted because many of those trained had no opportunity to use their skills.

❖ The role of medical officers in implementing IMCI is unclear. Medical officers are generally assigned to hospitals and do not usually have outpatient responsibilities. They are responsible for the quality of care delivered in their facilities and are consulted for difficult cases. Ideally, they should be familiar with IMCI so they can understand the evaluation of children referred to them and to support outpatient staff. However, medical officers seldom accepted invitations to IMCI training, stating they could not be away from their stations for the 11-day training. Further, the manner or extent to which they are expected to use the IMCI guidelines in their own work is unclear.

❖ Although IMCI supervisory activities did not occur as frequently as planned, systematic on-site supervision (that included the observation of health workers seeing sick children) remained a priority throughout the project. The IMCI trainers and supervisors felt that the improvements in case management achieved through IMCI implementation could not have been maintained without clinical supervision.

- IMCI implementation in hospitals was particularly challenging. First, workers and supervisors seemed to feel that IMCI was not appropriate or necessary in settings in which labs and x-rays were available. Second, although nurses are not allowed to write prescriptions in the hospital setting (and children presenting to hospital outpatient settings are supposed to be evaluated by a clinical officer), clinical officers are often assigned to wards and specialty clinics, leaving nurses in the uncomfortable position of being asked to evaluate and treat in the pediatric outpatient department when they were not authorized to do so. Further, hospital policies required that patients go to a central pharmacy (often in a different part of the facility) for drugs. In smaller facilities, drugs were usually dispensed by the health worker seeing the child or from a pharmacy near the consultation room. Because pharmacies and offices in hospitals were physically separated, many caregivers left immediately after obtaining drugs from the pharmacy. This interfered with the flow of IMCI and with counseling on the administration of medications.

- Although IMCI guidelines for fever in children do not recommend malaria microscopy, staff at health facilities in Bungoma frequently referred children under 5 with fever for a blood smear (two-thirds of children were so referred). Blood smear results were often not used effectively by clinicians (65 percent of patients with a negative result, i.e. no malaria, were prescribed antimalarial treatment). In addition, case management did not adhere to National Malaria Treatment Guidelines in a number of ways, e.g., 38 percent of patients without fever were prescribed antimalarial treatment.

- Although BDMI put considerable resources into IMCI case management training, the initiative has not yet achieved its target of training 60 percent of health workers who see sick children. Part of the problem is that health workers are frequently transferred to other districts. The mid-term review of BDMI and the work of the problemsolving teams, assisted by QAP, indicated that on-the-job training in IMCI might be helpful. Some facilities embraced the idea; some of the health workers who received such training performed well during the 2002 health facility survey.

**Lessons:**

- Combining IMCI case management training with a reasonable level of supervision, support, and follow-up can improve IMCI implementation.

- Measures of quality of care that are documented through supervision data and health facility surveys probably represent the upper limits of performance. Health workers acknowledge that they do not follow IMCI guidelines with every sick child, and many acknowledge that their performance is different when they are not being observed.

- It may not be possible to improve IMCI's implementation beyond a certain point until there is a significant change in the expectation for, monitoring of, and feedback regarding quality of care, or until there is a link between performance and salary or benefits.

- Implementing problemsolving teams at health facilities appears to be an effective strategy for improved IMCI classification and counseling.
- IMCI trainers and supervisors consider on-site clinical supervision an important part of

improving implementation.

- Hospital policies, such as those prohibiting nurses from writing outpatient prescriptions or requiring that patients go to a central pharmacy, can thwart improvements in implementing IMCI.

**Policy issues:**

- ✓ The performance of workers who have received on-the-job training will be formally evaluated in the analysis of the 2002 health facility survey. If the results are promising and if some support for IMCI in Bungoma were to continue, the district might consider a pilot test of training guidelines and certification of on-the-job training.

- ✓ Although the mid-term review of BDMI recommended pre-service training, this recommendation has not yet been implemented in Kenya. Two important steps are required: The training curriculum needs to be revised to include IMCI case management, and lecturers need to be trained in IMCI.

- ✓ Given the cost of IMCI training, alternative methods for orienting senior staff to IMCI so they can support its implementation by junior staff at a given facility should be explored.

- ✓ The role of medical officers in fostering the use of IMCI in their facilities and in their own work needs to be defined.

- ✓ The BDMI project has supported the cost of more intensive supervision of health workers trained in IMCI (e.g., the cost of vehicles and field allowances for supervisors). Assuming that these costs will not be supported once the project ends, the Bungoma District Health Management Team might want to try implementing a central system for supervision**.**

- ✓ The National Malaria Control Programme in Kenya recommends that microscopic diagnosis to confirm malaria cases should be made wherever possible. In contrast, WHO recommends the limited use of large-scale confirmatory diagnosis in areas with high rates of malaria transmission. The national programme should review current national guidelines on the appropriate use of blood smear microscopy, and BDMI and staff from CDC should participate in such a review if possible. In addition, the national programme should consider having the Bungoma District Health Management Team conduct a pilot test of a revised set of clinical guidelines for the use of malaria microscopy that follow WHO recommendations.

## Case Management of Sick Children at Home and in the Community

**Findings:**

- ❖ The vendor-to-vendor education intervention increased the number of vendors who gave correct advice and dosages of antimalarial drug to caretakers, and thereby addressed one cause of inappropriate treatment of malaria in children. The intervention assumes that better prescribing practices will improve client compliance with treatment and is considered an important step toward improving treatment.

- ❖ Antimalarial products available through drug outlets in Bungoma do not include a dosage that is suitable for use by children.

**Lessons:**

- ➢ One lesson *reconfirmed* through BDMI is that case management of sick children at home and in the community must be an integral part of any strategy aimed at improving child health and survival, because most children are treated at home, and many never are taken to a health facility.

- ➢ Training, motivating, and equipping mobile vendors and attendants at wholesale drug counters to communicate malaria guidelines to retailers appears to be an effective way to spread the message to small, dispersed outlets at a reasonable cost.

- ➢ Job aids (posters) that address the concerns and issues facing small retailers in complying with national malaria guidelines, written in a language that retailers can understand, seem to have significantly improved their compliance with the guidelines.

**Policy Issues:**

- ✓ Given the promise of the Vender-to-Vendor Education Program for improving malaria knowledge and prescribing practices among private drug outlets, QAP and AMREF recommended that the National Malaria Control Program in Kenya expand the strategy to all areas where malaria is endemic. Findings from a BDMI expanded vendor-to-vendor education program and also a complementary intervention (Neighbor-to-Neighbor) were not available at the time of this report's preparation. Once they are available, they should be useful in helping the national program decide how to scale up the vendor-to-vendor education program.

- ✓ The National Malaria Coordinating Committee is working to have a dosage appropriate for children provided by pharmaceutical companies. Key parties to BDMI should help to ensure that a children's dosage for malaria treatment becomes available.

**Management of Malaria During Pregnancy**

It is premature to present findings from BDMI's work in managing malaria in pregnancy because the interventions only began in October 2001. However, there are two lessons from the intervention to promote intermittent preventive treatment with sulfadoxine-pyrimethamine of pregnant women living in malaria-endemic areas.

**Lessons:**

- Implementing intermittent preventive treatments requires an integrated, multilevel approach; it is not enough to simply train health workers. The issues of drug supply, systems support, and community buy-in must be addressed simultaneously.

- Implementing an intervention such as intermittent preventive treatment should be an iterative process in which anticipated problems are addressed through pilot interventions, the results are assessed, and new trial solutions are devised and tested.

Another preventive strategy, promoting the use of insecticide-treated bed nets (ITNs) by pregnant women, is recommended by WHO. Through BDMI, some health facilities in Bungoma are serving as outlets for distribution of ITNs to pregnant women, and BDMI started subsidizing the cost of ITNs in January 2002. There are no findings or lessons yet from this intervention.

**Use of Insecticide-Treated Materials**

**Findings:**

- In 2000, the project team selected an initial group of 15 distribution outlets and provided training and supplies to promote the use of insecticide-treated nets. Within three months, about 3,000 nets had been sold, and outlets had repaid 95 percent of the value of the advance supplies. Based on this pilot effort, the strategy for net distribution was deemed feasible.

- Following the pilot's success, the ITN strategy was scaled up. The ITN coverage rate increased from 12 percent to 20 percent after 18 months, although less than a third of the nets (29 percent) had been treated with insecticide. AMREF staff credit the increase in coverage to a combination of BDMI efforts and the Population Services International social marketing program that started in 2000.

- While the BDMI-supported outlets were effective in selling ITNs to certain groups of consumers (salaried civil servants and teachers), it is too soon to judge the effect of subsidized distribution on lower-income groups, for whom cost is reported to be a major constraint.

- The multifaceted approach to implementing the ITN strategy may be important to the strategy's effectiveness. The key components are training in business, related skills, and

general malaria control; provision of an initial supply of ITNs; and IEC for the community. Additional evaluation is needed to determine whether these components are indeed critical and whether the strategy can be sustained.

**Lessons**

- The criteria used in selecting distribution outlets are key in the distribution effort's success. (The five criteria are listed in Section 2.4 of the report, p. 44.)

- Equipping existing community-based distribution outlets is an effective strategy for increasing ITNs' availability by selling nets and insecticide tablets. Community-based groups provide a readily available distribution system in rural areas, and do not require the large amounts of funding needed to establish social marketing of ITNs.

**Policy issue:**

- ✓ The government of Kenya levies taxes on mosquito nets and insecticides accounting for about 45 percent of their cost. Waiving the taxes would make ITNs much more affordable. While the government has already reduced taxes on imported ready-made mosquito nets, a 20 percent duty tax on netting materials remains, and there has been no tax reduction on insecticides. Key parties to BDMI should help to ensure that the taxes on netting materials and insecticides for bednets are removed or reduced.

**Monitoring and Evaluation**

**Lessons:**

- The involvement of local counterparts from the district, province, and national levels in the development of an M&E plan, as well as the collection and use of M&E data, ensures that useful information will be collected and actually used to improve the project and to apply the findings more broadly within the country. Involving local counterparts also leads to improved skills and to greater local capacity to carry out M&E.

- The iterative and research-based model, which was an integral part of BDMI, is an effective approach to applying baseline information in order to develop and modify interventions.

- Obtaining relevant baseline information for project indicators can be very time-consuming in the early phase of the project, but such information is essential for assessing the project's implementation and achievements.

- The collection of vital registration data demonstrates some potential for the data's use in efforts to monitor programs. Seasonal patterns in mortality and similarity in districts' year-to-year variations suggest that the data reflected reality to some degree. However, further analysis has shown that there is no way to be sure about the completeness of

reporting or, more importantly, whether completeness of reporting varies over time. Until these issues are resolved, vital registration data are not useful for monitoring programs.

- Governments and donors need to reconsider the value of efforts to assess the overall impact of interventions on morbidity and mortality. Careful assessment of two sources of data (vital registration and hospital surveillance data of child deaths) revealed that the data are not of sufficient quality to be useful for assessing impact.

- Involving the national Health Management Information System officials in the design of new health information forms is crucial for preventing parallel systems of reporting. However, such involvement can be a slow process, due to government bureaucracy, and can hamper timely implementation of project innovations.

- The process of using and disseminating research findings from a pilot project, such as BDMI, necessarily involves those individuals responsible for the design and implementation of interventions. However, the process must also reach beyond the principal actors on the project to broader audiences, including national health officials and international organizations and donors. Such outreach should be built into the initial phase of project implementation, and should continue throughout the project's life.

**Policy issue:**

- ✓ Staff of one cooperating agency (CA) working on BDMI has suggested that it would be useful to conduct another household survey to follow up the 1996 baseline household survey so that changes over the 1996-2002 could be measured. A household survey to assess changes in use of ITNs is being planned; such a survey might also assess changes in caretakers' practices in caring for sick children, allowing researchers to determine whether such changes could be attributed to BDMI interventions. The one caveat for conducting a household survey in 2002, the project's final year, is that some of the interventions to be assessed may not have been going on long enough to observe changes in key behaviors.

**Management and Coordination**

**Finding:**

- ❖ The management innovation in BDMI was having a local NGO, AMREF, be responsible for coordination and, to a lesser extent, implementation. Several key features, described in the body of the report, have contributed to making coordination of project activities more effective.

## Role of Cooperating Agencies

**Finding:**

- ❖ The BMDI project design and implementation included technical expertise and assistance from USAID CAs. Although such expertise can be very useful, there are legitimate questions about the sustainability of CAs' involvement. Because DMHT was an implementing partner for most of the project's activities, efforts in a number of areas may be sustainable.

**Lessons:**

- ➢ CAs bring technical expertise and experiences from work in other settings.
- ➢ CA staff contributes to the overall level of effort devoted to implementing various tasks. For example, supervisors and DHMT did not have time to analyze information on supervisory forms, and so CDC staff was called on to analyze the data.
- ➢ CAs serve as motivators for local staff to keep implementation activities on schedule.
- ➢ CAs tend to push for the application of findings from research that they have helped to implement, so their involvement serves to remind local staff, who are charged with everyday implementation, of the importance of data-driven programs.
- ➢ CA staff members are not always available when it best suits project implementation. Furthermore, different CAs sometimes compete for local staff's time when planning and carrying out their technical assistance visits.
- ➢ Communication among various groups involved in BDMI (CAs and AMREF) was sometimes problematic, especially in terms of having reports available to all groups. E-mail has helped, but a website with relevant reports, instruments, and documents would have been useful. The annual planning meetings were a useful forum for updating the project partners.

## Sustainability

Under BDMI, sustainability is defined in terms of the capacity of the district Ministry of Health (MOH) staff, principally DHMT, to continue the activities once the project has ended.

**Finding:**

- ❖ The sustainability of BMDI-supported efforts to improve supervision of district health workers is in doubt because the resources needed (for both transportation costs and travel allowances) have been covered by the project. Although the MOH headquarters has not allocated additional funds for supervision, DHMT has spent part of its 25 percent cost-

sharing funds with the MOH for supervision. The cost-sharing funds are not adequate for BDMI supervision, so the intensity and frequency of supervisory visits will probably not be sustained after the project ends.

**BDMI Links to National Health and Malaria Policies and Programmes**

**Findings:**

- Since the start of the BDMI project in 1998, IMCI has become a part of the national health policy, and the national adaptation process of IMCI has been completed in that the generic WHO/UNICEF training materials have been adapted to Kenya's needs. BDMI and its predecessor projects can take some credit for this policy change.

- As members of the National Malaria Coordinating Committee, USAID and AMREF successfully advocated changing the government's drug supply policy on sulfadoxine-pyrimethamine (SP), MOH's first-line antimalarial treatment. The original policy had required a license costing 1000 shillings, making the drug prohibitively expensive for small businesses. The law was changed in 2000, and SP is now sold over the counter. This legal change was critical to the success of BDMI's training program for drug vendors and community-owned resource persons to provide SP.

- BDMI successfully persuaded the manufacturer of Malaratab, the most popular brand of amodiaquine, to correct the dosage information that appears on the drug's label.

- To a limited extent, BDMI has helped improve knowledge and skills about IMCI and ITNs among health workers in other districts, resulting in a multiplier effect of its training activities.

- BDMI's activities (e.g., training, in-service supervision, and referrals) are an integral part of DHMT's work because the project is implemented by the MOH through the DMHT, with technical assistance from USAID-supported cooperating agencies.

- A district Community Integrated Management of Childhood Illness committee has been established to coordinate and monitor various partners' activities related to BDMI's CIMCI intervention. However, multi-sectoral collaboration between ministries, such as the MOE and MOH, is difficult because of ministries' different operational and budgeting plans and procedures.

**The Future**

Much work remains to be completed in the final year of BDMI, and a very important part of this remaining effort is the various assessments to determine the outcomes of the four health interventions. As these assessments are done, BDMI, DHMT, the MOH at the provincial and national levels, and USAID should ensure that the results are widely disseminated and used in scaling up Roll Back Malaria and expanding IMCI. One further step should be to revisit

the lessons learned in this report and add additional lessons that have been gleaned from the project's final year of activities.

## List of Boxes, Tables, and Figures

***Boxes***



***Tables***



***Figures***



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# ACRONYMS

| | |
|---|---|
| AIMI | Africa Integrated Malaria Initiative |
| AMREF | African Medical Research and Education Foundation |
| ANC | Antenatal care |
| APHIA | AIDS Population and Health Integrated Assistance |
| AQ | Amodiaquine |
| BASICS | Basic Support for Institutionalizing Child Survival |
| BDI | Bungoma District Initiative |
| CA | Cooperating Agency |
| CARE | Cooperative for Assistance and Relief Everywhere |
| CDC | Centers for Disease Control and Prevention |
| CHW | Community health worker |
| CICSS | Community Initiatives for Child Survival in Siaya |
| CIMCI | Community Integrated Management of Childhood Illness |
| CORPS | Community Owned Resource Persons |
| DHMT | District Health Management Team |
| DOMC | Division of Malaria Control |
| FINNIDA | Finnish Development Agency |
| GOK | Government of Kenya |
| HIS | Health information system |
| HMIS | Health management information system |
| HF | Health facility |
| HW | Health worker |
| IEC | Information, education, and communication |
| IMCI | Integrated management of childhood illness |
| IPT | Intermittent presumptive treatment |
| ITM | Insecticide-treated materials (bed nets, curtains) |
| KAP | Knowledge, attitude, and practice |
| MOH | Ministry of Health |
| M&E | Monitoring and Evaluation |
| NMS | National Malaria Strategy |
| NGO | Nongovernment organization |
| OCG | Organized community group |
| OR | Operations research |
| PHT | Public Health Technician |
| QAP | Quality Assurance Project |
| RBM | Roll Back Malaria |
| SP | Sulfadoxine-Pyrimethamine (Fansidar) |
| TA | Technical assistance |
| TBA | Traditional birth attendant |
| TOT | Training-of-Trainers |
| UNICEF | United Nations Childrens Fund |
| USAID | United States Agency for International Development |
| VHC | Village-health committee |
| WHO | World Health Organization |

# 1. INTRODUCTION

In 1997, the government of Kenya (GOK) issued a revised and broadened National Population Policy for Sustainable Development, whose goals included reducing levels of infant and child mortality and maternal mortality. The Ministry of Health (MOH) has also proposed a series of reforms to improve its ability to meet the health needs of Kenyans. Among the proposed changes is the adoption of a strategy to reduce the burden of disease through a combination of curative and preventive health services (National Council for Population and Development et al. 1999). Malaria is one of the government's most serious health concerns.

It is estimated that about 26,000 children die each year from malaria, and about one-third of visits to health facilities are due to malaria. Pregnant women are also vulnerable to malaria infection even if they have developed immunity while living in areas where malaria is endemic. A pregnant woman has an increased risk of infection due to changes in her immune system, and first-time mothers are especially vulnerable to infection. Rates of placental parasitemia range from 9 percent to 18 percent during times of lower and peak transmission, respectively. Among first-time mothers, placental parasitemia reaches highs of 28 percent (Williams and Mungai 1999; Mungai and Parise 2000). Pregnant women suffering from malaria are at increased risk of anaemia and miscarriage, and their babies are at risk of stillbirth, prematurity, intrauterine growth retardation, and low birth weight. Malaria also contributes to maternal deaths because pregnant women are more susceptible to complications from malaria….[It is estimated that] "malaria causes up to 15 percent of maternal anaemia and about 35 percent of preventable low birth weight in babies whose mothers were infected."

Given the high prevalence of malaria in Kenya, the MOH has focused considerable attention on reducing morbidity and mortality associated with the disease. In 1998, the ministry issued new national guidelines for the diagnosis, treatment, and prevention of malaria. The GOK is also participating in the World Health Organization's (WHO) Roll Back Malaria initiative (RBM; see Box 1). In 2001, as part of Africa Malaria Day, the MOH launched its National Malaria Strategy, whose goal is a 30 percent reduction in malaria in Kenya by 2006

The need to address infectious diseases, especially malaria, became acute during the 1990s, when mortality rates for Kenyan children under 5 years old rose from 99 deaths per 1,000 children in 1993 to 112 deaths per 1,000 children in 1998 (Kenya Demographic and Health Survey 1998); in other words, one of every nine Kenyan children dies before reaching his or her fifth birthday. Malaria continues to have a major effect on the health and survival of children in Kenya, particularly in areas where malaria is endemic or where epidemics appear periodically. Since the mid-1980s, there has been a re-emergence of malaria, in part due to increasing drug resistance and to inadequate health services.

## *Box 1 WHO's Roll Back Malaria*[1]

***Roll back malaria is a global partnership to halve the world's malaria burden by 2010.***

*In 1998, the WHO, the United Nations Development Programme (UNDP), UNICEF, and the World Bank initiated the global Roll Back Malaria (RBM) partnership.*

RBM is enabling developing countries, particularly in Africa, to take effective, sustainable action against malaria by focusing on:

- Providing prompt access to effective treatment
- Preventing and controlling malaria during pregnancy
- Promoting the use of insecticide-treated mosquito nets as a means of prevention
- Dealing effectively with malaria in emergency and epidemic situations.

Countries are working together with RBM partners and donors to:

- Prepare strategic plans to tackle malaria;
- Reduce or waive taxes and tariffs on insecticide-treated mosquito nets and insecticides with the aim of bringing prices down to an affordable level;
- Expand their capacity to deliver interventions to those who need them most. Debt relief is a major long-term means of securing funds to 'scale-up' interventions and ensure their sustainability; and
- Implement health sector reforms to improve access to key interventions, such as the delivery of insecticide-treated mosquito nets (ITNs) and antimalarial drugs.

Specifically in Kenya, the major expected outcomes by 2005[2] are:

- 80% of all antimalarial drugs, provided through formal and informal sectors, are of internationally acceptable pharmacological standards.
- 60% of malaria cases are appropriately managed at home by family members or caretakers.
- 80% of first-line therapeutic failures and cases of severe, complicated malaria are correctly managed by health personnel in appropriate facilities.
- 60% of pregnant women have two PIT sessions (in their second and third trimesters).
- 80% of febrile or anaemia episodes are appropriately managed at antenatal care services.
- 60% of pregnant women sleep under an ITN.
- 60% of the at-risk population sleep under nets.
- 60% of epidemics are effectively contained through appropriate use of interventions, including community mobilization, effective case management, ITNs and/or IRS.

SOURCE: [1]From the print version of the link "What is RBM?" on www.rbm.who.int
[2]WHO. Country Strategies and Resource Requirements. 2001.34. page 17.

For over two decades, the United States Agency for International Development (USAID) has been assisting efforts to improve health and survival in Kenya, and is the leading donor to Kenya's population and health programs (USAID 2001). Since 1998, USAID has been supporting a pilot project in the Western Province: the Bungoma District Malaria Initiative (BDMI).

## 1.1 Bungoma District Malaria Initiative

BDMI is a five-year project (1998 - 2002) funded by USAID and the GOK at an estimated cost of $5 million.[2] The goal of the initiative is to reduce mortality and morbidity, especially severe illness, due to malaria. The project's activities are designed to address five objectives:

- Improved management of fever and anaemia, mainly among young children (less than five), by health workers at health facilities;
- Improved capacity of mothers and other caretakers to manage fever and anaemia in young children at home;
- Improved prevention and management of malaria in pregnant women;
- Increased household use of insecticide-treated materials; and
- Effective collection and use of information for planning, monitoring, and evaluation.

Although the initiative officially began in 1998, several baseline studies had been undertaken, beginning in 1994, to provide information for the project's design and structure (see Box 2). A 1996 household survey of home treatment of children with fever, use of bed nets, and attendance at antenatal clinics provided information on some of the key household behaviors relevant to BDMI (Hamel et al. 2001). Several interventions that were initiated in 1996 can also be considered forerunners to BDMI (see Section 2.1). Box 3 presents a list of expected accomplishments over the life of the project.

Bungoma was selected as the site for the initiative for several reasons: The district's burden of malaria was high; child mortality in the Western Province, at 123 deaths per 1,000 children in 1998, was above the national average; the MOH was supportive; and the district was home to a variety of reasonably good health providers, including both MOH and private facilities. Finally, the Kenya-Finland Primary Health Care Programme had been based in districts in the Western Province, one of which was Bungoma. BDMI provided opportunities for collaboration and building upon prior USAID and Finnish Development Agency (FINNIDA) support to improve the health infrastructure.

[2] The project was initially called the Bungoma District Initiative (BDI). It is part of the Kenya USAID Mission's child survival project (AIDS Population and Health Integrated Assistance, or APHIA), which emphasizes assistance to districts. The project is also a component of USAID's regional Africa Integrated Malaria Initiative (AIMI), which is being implemented in three other African countries: Benin, Malawi, and Zambia. AIMI has two goals: to explore programmatic options for reducing morbidity and mortality among children under 5 years of age and among pregnant women, and to strengthen local capacity to deliver effective, sustainable integrated malaria control at health facilities.

## Box 2: Key Events and Activities Related to BDMI, 1984-2001

(entries in *italics* are key antecedents to BDMI)

| Date | Event or Activity |
|---|---|
| **Before BDMI** | |
| 1984 | Kenya-Finland Primary Health Care Program (K-FPHCP) begun under MOH in Western Province; program ends in 1996 |
| 1993 | National Demographic and Health Survey conducted (1993 KDHS) |
| 1994 | WHO and UNICEF developed IMCI guidelines |
| | *Baseline studies on management of sick children in rural health facilities in western Kenya conducted by Centers for Disease Control, MOH, and K-FPHCP* |
| 1995 | Qualitative study on reasons for gaps in health workers' practices |
| 1996 | Western Province selected as site for USAID's bilateral Child Survival Project (under AIDS Pop. and Health Integrated Assistance (APHIA]) |
| | *IMCI training for clinical health workers introduced in Bungoma and Vihiga districts* |
| | *Baseline household survey conducted in Bungoma* |
| 1996-97 | *IMCI supervision begun; IMCI checklist for supervisors used* |
| | *IMCI training assessments done* |
| 1998 | MOH issued new national guidelines for diagnosis, treatment, and prevention of malaria |
| **BDMI Project Period (1998-2002)** | |
| March 1998 | BDMI project started |
| October 1998 | MOH changed national malaria treatment policy to include intermittent preventive treatment (IPT) with sulfadoxine-pyrimethamine for pregnant women living in endemic areas |
| | Roll Back Malaria initiative launched by WHO, UNDP, UNICEF, and the World Bank |
| | National demographic and health survey conducted (1998 KDHS) |
| 1999 | Kenya Service Provision Assessment conducted (1999 KSPA) |
| March 2000 | MOH adaptation of IMCI algorithm completed at the national level |
| February 2001 | Kenya's new National Malaria Strategy for 2001-2010 launched by the MOH, with goal of reducing burden of malaria by 30 percent by 2006 |

## Box 3: BDMI Expected Accomplishments over the Five-year Project Period

**People-Level Impact**

- Reduction in the numbers of deaths and cases of severe illness attributable to malaria infection through improved access to and use of service for diagnosis and treatment of malaria infection.
- Reduction in malaria infection through improved access to and use of insecticide-treated materials.

**Community/household-Level Impact**

- Increased capacity at the household level for early recognition of the signs of febrile illness by mothers and other caretakers, leading to prompt and appropriate health-seeking behaviour for malaria management.
- Increased recognition of the high risk of maternal infection and demand for appropriate chemoprophylaxis treatment.
- Increased access to appropriate and affordable antimalarials.
- Increased demand for and access to insecticide-treated materials and insecticides

**Health Facility—Level Impact**

- Improved capability of clinicians to diagnose and treat febrile illness, anaemia and maternal malaria infection, including referral and management of complicated illness, counselling caretakers, and interpersonal communication.
- More cost effective use of human and material resources through improved planning, management, training and supervision.

**National and Regional-Level Impact**

- Dissemination of information on how to design and implement facility and community-based approaches for the delivery of effective and sustainable control of malaria.

SOURCE: Olenja, Joyce M, et al. "Mid-Term Review of Bungoma District Malaria Initiative (BDMI): For USAID-Kenya and MOH, Kenya." June 2000. pp. 24-25. Authors also include: Maria Francisco, Zablon Barake, Simon Danda

The BDMI pilot project is testing the potential impact of two integrated strategies. The first strategy combines both curative and preventive health measures, using three well-recognized methods: early and effective treatment of fever episodes in children; reduction of placental malaria infection by providing intermittent preventive treatment (IPT) to pregnant women; and use of insecticide-treated materials (especially bed nets). The second strategy, which involves improving children's health, is the Integrated Management of Childhood Illness

(IMCI), adopted by WHO and UNICEF in 1994. IMCI involves complementary interventions in the community, at health facilities, and in the overall health system (see Box 4).[2]

## Box 4. What is IMCI?

IMCI is an integrated approach to child health that focuses on the well-being of the whole child. IMCI aims to reduce death, illness and disability, and to promote improved growth and development among children under 5 years of age. IMCI address multiple illnesses, including but not limited to malaria, which may account for about 70 percent of childhood deaths in developing countries. IMCI includes both preventive and curative elements that are implemented by families and communities as well as by health facilities.

How does IMCI accomplish these goals?

Introducing and implementing the IMCI strategy in a country is a phased process that requires a great deal of coordination among existing health programs and services.

The main steps involve:

- Adopting an integrated approach to child health and development in the national health policy.
- Adapting the standard IMCI clinical guidelines to the country's needs, available drugs, policies, and to the local foods and language used by the population.
- Upgrading care in local clinics by training health workers in new methods to examine and treat children, and to effectively counsel parents.
- Making upgraded care possible by ensuring that enough of the right low-cost medicines and simple equipment are available.
- Strengthening care in hospitals for those children too sick to be treated in an outpatient clinic.
- Developing support mechanisms within communities for preventing disease, for helping families to care for sick children, and for getting children to clinics or hospitals when needed.

SOURCE: http://www.who.int/child-adolescent-health/integr.htm

Three institutions are implementing the BDMI project: the Kenya Ministry of Health, the Bungoma District community (with particular responsibility given to the Bungoma District Health Management Team [DHMT]), and the African Medical and Research Education Foundation (AMREF), a local nongovernmental organization. The MOH formulates national health policies, develops strategies and guidelines for malaria control, and is responsible for Kenya's Roll Back Malaria effort. The Bungoma DHMT is responsible for overall field implementation, as well as technical leadership and management oversight. AMREF provides both technical assistance and project coordination.

[2] USAID's regional Africa Integrated Malaria Initiative incorporated IMCI so that the training of health workers would address the multiple and overlapping causes of childhood illness, since sick children often suffer from more than just fever.

Two USAID-funded cooperating agencies, the Centers for Disease Control and Prevention (CDC) and the Quality Assurance Project (QAP), are providing technical assistance. Another cooperating agency, Basic Support for Institutionalizing Child Survival (BASICS), provided technical assistance during the first years of the BDMI project. CDC has been responsible for evaluating and assisting with the introduction of the IMCI clinical guidelines. QAP has helped address facility management issues and, with AMREF, has assumed responsibility for the initiative's home/community component. CDC has also assisted with research on malaria in pregnancy, and has worked with AMREF and the Bungoma DHMT to plan interventions in this area. Both AMREF and DHMT have been addressing the use of insecticide-treated materials. In addition, MEASURE *Communication* is helping BDMI, with USAID/Kenya support, to disseminate findings and lessons learned during the final phase of the project.

BDMI has received an estimated total of $5.8 million. The sources, levels, and allocation of funding are as follows:

**Table 1**
**Sources of Financial Support to BDMI, 1998-2002**

| ***Allocation of funds*** | **Bilateral USAID** | **USAID/W** |
|---|---|---|
| USAID Cooperating Agencies | | |
| CDC | | 1,500,000 |
| QA | | 1,500,000 |
| BASICS | 700,000 | |
| Kenyan Organizations and Programs | | |
| AMREF | 900,000 | |
| **Other** | 1,185,000***** | |
| Total | 2,785,000 | 3,000,000 |

*There was no information on the allocation of the $1,185,000 of field support funds from USAID Kenya's Environmental Health Project among the cooperating agencies.

## 1.2 Purpose of This Report

This report summarizes preliminary findings and lessons learned from the BDMI project after four of its five years. The report is intended to inform several audiences: the MOH's National Malaria Control Programme, the IMCI Division in the MOH, the Bungoma DHMT, USAID, and international organizations, including UNICEF and WHO.

The following three sections of the report describe the BDMI activities and, wherever possible, present lessons learned (see appendix 1 for complete list of lessons learned). Some lessons are not new, but have been reconfirmed through the implementation of the project. Section 2 presents findings and lessons on four of the project's objectives. Section 3 describes the monitoring and evaluation (including operations research) work under BDMI. Section 4 presents information on a variety of topics, including management and coordination, the role of cooperating agencies, project sustainability, and links to national health and malaria policy and programmes. The final section of the report presents conclusions.

# 2. PROJECT OBJECTIVES

The BDMI project strategy to reduce malaria supports four direct interventions.[3] Two are curative, and are meant to improve the treatment of sick children under 5 years of age, both in health facilities (referred to as "case management in health facilities") and at home ("case management at home/community"). A third intervention is preventive, and is intended to protect pregnant women from getting malaria ("management of malaria in pregnancy"). The fourth intervention, which is also preventive, involves promoting household use of insecticide-treated bed nets ("use of insecticide-treated materials").

These interventions have been shown to reduce morbidity and mortality from malaria when they are carried out correctly (Meek et al. 2001). However, the ongoing challenge is to demonstrate that the interventions can be implemented successfully in different settings and over time.

Below is a description of the BDMI project interventions and lessons learned. A timeline is presented for each of the four intervention areas, summarizing different activities and interventions. The lessons are drawn from the findings of various research and evaluation studies (some carried out before BDMI began, and others conducted during BDMI's implementation), the midterm evaluation of BDMI (Olenja et al. 2000), other project reports, and interviews with several key informants. Since a number of the evaluation activities are not yet complete, these lessons are preliminary (see Box 10, in Section 3, for planned monitoring and evaluation activities).

## 2.1 Case Management in Health Facilities[4]

Although the BDMI project was conceived as a malaria prevention and treatment intervention focusing on children under 5 years of age and on pregnant women, there had already been considerable work applying the integrated management to childhood illness (IMCI) approach in Bungoma. Some of the baseline studies and early interventions related to IMCI were conducted under the auspices of the Kenya-Finland Primary Health Care Project. Activities were continued and expanded as part of BDMI. Thus, BDMI has provided support for the continued testing of efforts to improve the use of the IMCI guidelines for case management in health facilities.

[3] WHO has two additional direct interventions in its malaria control initiative: indoor residual spraying in certain environments, and epidemic control. Residual spraying was not included in the BDMI design because it was considered too costly for a program of BDMI's size. Also, experts who helped design the project thought that insecticide-treated bed nets would be more cost-effective, in the long run, for preventing malaria. Since Bungoma District is an endemic malaria zone, the issue of malaria epidemics is not relevant.

[4] Elizabeth Herman of CDC contributed the following subsections to the discussion of case management at health facilities: best practices and the potential for improvement before BDMI began; initial efforts to improve quality of care; IMCI supervision; addressing persistent deficiencies in health workers' performance; the description of the intervention to improve the management of children with severe illness, diarrhea, or anaemia; and findings and lessons on this section.

The advantage of IMCI is that it provides an opportunity to assess sick children for the most common causes of childhood illness and mortality. IMCI guidelines define the minimum standards of care at primary health care facilities, and include explicit guidance for assessment, diagnosis, treatment, referral, and patient education, as well as for vaccinating children who have not had the full course of immunizations.

In 1993, when the Bungoma District ministry of health made a commitment to implement the IMCI strategy, it did so knowing that in-service training in clinical guidelines alone had been insufficient to improve health worker practices in other disease control efforts (such as control of diarrheal diseases and acute respiratory infections). The ministry assumed that changes in health workers' performance and health outcomes could be achieved only through implementation of all three components of the IMCI strategy: improvements in the health workers' case management skills, through training and follow-up in the IMCI guidelines; improvements in the health system for effective case management of childhood illness; and improvements in home/community care practices (Lee et al. 1998)

## Before BDMI: Baseline Practices and the Potential for Improvement[5]

In 1994, following the decision to implement the IMCI strategy in Bungoma, a baseline health facility survey (HFS) of government health facilities was conducted. Health workers were observed while providing care to sick children, children's caregivers were interviewed after the encounter, and children were re-examined by clinicians trained and experienced in using the IMCI guidelines. The survey also included interviews with the health workers, as well as health facility assessments that documented the availability of drugs, supplies, and equipment. The survey's results showed that there were gaps between existing health practices and those prescribed by the IMCI guidelines. Only 5 percent of children with severe illnesses were correctly treated and referred; 50 percent of moderate illnesses in children were correctly treated. The survey found that health facilities often opened late and that there were long delays before the first patient was seen. On average, health workers spent only 4.5 minutes with each child, far less than is required for adequate assessment, classification, treatment, and counseling. Little courtesy was shown to mothers, drug instructions were incomplete and easily misunderstood, and mothers were not told the child's diagnosis. Further, clinical assessment was inadequate for accurate diagnosis, underimmunized children were not vaccinated, and drugs and injections were overprescribed (Lee et al. 1998).

IMCI implementation in nongovernment (NG) health facilities did not begin until 1999. A 1999 baseline survey , conducted under BDMI before any interventions were introduced, showed that NG health workers' performance in treating moderate and severe illnesses was similar to that of health workers in GOK facilities (Herman 1999). There was evidence of considerable overtreatment in both types of facilities: Among children whom health workers classified as having cough or cold (with no other indication for antibiotics), 78 percent of children in GOK facilities and 77 percent of children in NG facilities were treated with antibiotics.

[5] While most of this discussion covers work conducted prior to the start of BDMI, one study of IMCI in nongovernmental health facilities was conducted under BDMI.

In the NG health facility survey, 9 children out of 23 (39 percent) with no fever reported in history or exam were prescribed an antimalarial drug. Although 81 percent of 123 children with fever reported in history or exam received an antimalarial drug, only 61 percent received one of the first-line antimalarials recommended by the Kenyan government's guidelines. Further examination of malaria treatment revealed additional problems. Of the 120 cases of malaria diagnosed by health workers, 42 cases (35 percent) were treated with two or more antimalarial drugs, increasing both the treatment's cost and the potential for side effects and toxicity. Corresponding data on antimalarial prescriptions from GOK facilities have not yet been reported.

Data collected during the 1994 baseline health facility survey were analyzed to estimate what impact IMCI treatment guidelines would have on treatment costs. The cost of all drugs actually prescribed by health workers was estimated and compared to the cost of drugs that were indicated according to the classifications of the expert examiner**.** The average cost of drugs prescribed by non-IMCI trained health workers was $0.44 per child. Nearly 60 percent of the cost was for phenoxymethylpenicillin syrup; and 75 percent of the prescriptions for the syrup were given inappropriately for the treatment of a simple cough or cold. Had the same children's cases been managed according to the IMCI guidelines, the drugs prescribed would have cost between $0.16 per patient (based on a formulary of larger-dose tablets and a home remedy for cough) to $0.39 per patient (based on a formulary of syrups or pediatric-dose tablets and a commercial cough preparation) (Boulanger et al. 1999).

## Initial Efforts to Improve the Quality of Care

Following the 1994 baseline survey, health workers were interviewed to determine why there were gaps in recommended practices. Health workers cited a number of reasons for poor practices, including lack of skills and motivation, lack of supervision, peer pressure, established performance norms, perceived lack of time, pressure from mothers or other caregivers, the need to perform multiple tasks (such as stocking drugs and sterilizing instruments), and the belief that a physical exam is not necessary to make a diagnosis (CDC and USAID 1997). Using a simple problemsolving framework, health care workers and district supervisors identified what they felt were feasible and sustainable strategies for addressing each of the problems cited. Strategies included training health care workers in IMCI, increasing the number of patient consultation hours, expanding district supervision to include evaluation of health care workers' clinical skills, informing mothers or other caregivers about health care facilities' procedures and treatment guidelines, and expanding community financing of essential drugs.

Implementation of these strategies began at the end of 1995. In-charges (officers in charge) at all health facilities were given an overview of the IMCI guidelines, using draft WHO training materials. The in-charges were asked to nominate two health workers who were often responsible for seeing sick children to receive IMCI training. In-charges were asked to assign these health workers to clinic areas where they would see sick children regularly for at least three months after training. Between February and October 1996, nine 15-day training courses were conducted using the generic WHO/UNICEF materials. The courses included four days of supervised clinical practice (Lee et al. 1998).

Part of the four-day clinical practice involved end-of-training (EOT) clinical assessments to determine whether the health workers had obtained the skills necessary to implement the IMCI guidelines. As part of the post-training support, IMCI-trained supervisors began providing clinical supervision, including observation of case management and immediate feedback. Health workers' performance during follow-up was documented using the same forms developed for the EOT assessment. In addition, cost recovery was instituted to generate funds for essential drugs, and steps were taken to improve time management.

In 1996 and early 1997, EOT assessments of health workers and performance during supervision visits conducted 1-3 months post training were compared to determine whether deficiencies in performance were the result of never obtaining the necessary skills during training or of losing skills over time. The results, presented in Table 2, showed that IMCI training led to reasonably good performance in the treatment of moderate illnesses, particularly in the treatment of uncomplicated malaria, although performance scores for the treatment of severe disease, including severe febrile disease, were poor. It was encouraging, however, that performance levels reached at end-of training were sustained in the short term (Odhacha et al. 1998).

**Table 2**
**Percent of Illnesses Correctly Treated* at the End of IMCI Training (EOT) and 1-3 Months Post Training (1-3MPT), 1996 and 1997**

| Classification | EOT | | 1-3MPT | |
|---|---|---|---|---|
| | Number** | Percent | Number** | Percent |
| All Severe Classifications | 173 | 32 | 74 | 26 |
| Very Severe Febrile Disease | 48 | 31 | 24 | 8 |
| All Moderate Classifications | 656 | 84 | 152 | 85 |
| Malaria | 384 | 95 | 96 | 99 |

*Including referral for severe cases.
**Refers to the number of children with the classification.
Note: Training was conducted in 1996. Some of the 1-3 months post training assessments occurred in early 1997

In 1997, a follow-up survey of government health facilities was conducted to further evaluate the effectiveness of the interventions described above. Figure 1 compares 1997 survey results on the appropriate treatment of sick children (not including referral) with the results of the 1994 baseline survey, the EOT assessments, and the results of supervisory visits made 1-3 months post health workers' training. Although health workers' performance was not optimal, particularly in the management of severe illnesses, the 1997 results show a consistent and statistically significant improvement in performance over the 1994 baseline findings (Lee et al. 1998).

**Figure 1**
**Improved IMCI treatment practices as a result of training, 1994 – 1997**

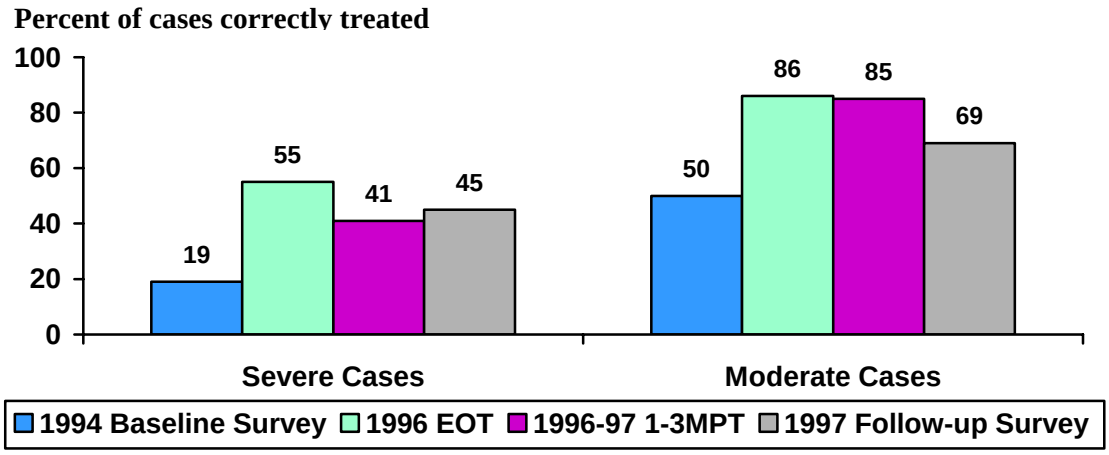
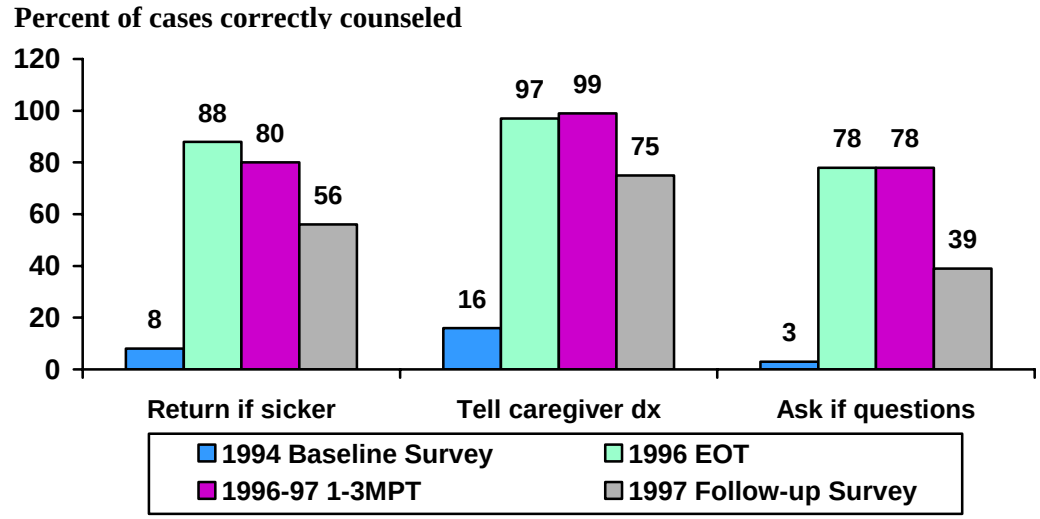



Figure 2 demonstrates the dramatic improvements in counseling performance that can be achieved with IMCI training. Although performance relative to end of training dropped off in the follow-up survey, there was still a marked improvement over baseline results: Health workers were more likely to counsel the caregiver to return immediately if the child became sicker, to tell the caregiver the diagnosis, and to ask whether the caregiver had any questions.

**Figure 2**
**Improved IMCI counseling practices as a result of training, 1994 - 1997**



## BDMI Interventions to Improve Case Management at Health Facilities

The following discussion presents the three different sets of activities that make up the BDMI-supported interventions for improving both case management at health facilities and the diagnosis and treatment of malaria. The first set of activities involves work by the DHMT, the Quality Assurance Project, and AMREF to improve health workers' IMCI performance through problemsolving teams. The second is a joint effort by the DHMT and the CDC to improve IMCI supervision and health worker performance. The third set of activities, which does not address IMCI implementation per se, examines the use of microscopy for the diagnosis and treatment of malaria. Box 5 presents a timeline for each of these sets of activities.

### Box 5. Timeline of Major BDMI Activities for Case Management at Health Facilities, 1998-2002 (presented as sets of activities and interventions)

| *Date* | *Activity or Intervention* |
|---|---|
| | **Collaboration Between DHMT, QAP, and AMREF** |
| 1998 | Case study of health workers' IMCI performance |
| 1998-1999 | Intervention to improve health worker performance:<br>• Training of coaches<br>• Establishment of facility-based problemsolving teams |
| 2000 | Assessment of health workers' IMCI performance using problemsolving teams |
| | **Collaboration Between DHMT and CDC** |
| 1998-2002 | Continued IMCI supervision |
| 1998-1999 | Assessment of supervision records |
| 1999 | Assessment of sick children's quality of care at nongovernmental facilities |
| 2000 | Assessment of IMCI-trained health workers' performance with severely ill children |
| 2001 | Intervention to improve case management of severe illness, diarrhea, and anaemia:<br>• Introduction of IMCI clinical registers/job aids;<br>• IMCI promotional site visits; and<br>• Introduction of facility-based incentives |
| 2001 | Assessment of IMCI clinical registers |
| 2002 | Bungoma District health facility survey |
| | **Collaboration Between District Medical Laboratory Technician and Clinical Officer, CDC, and AMREF** |
| 1999 | Assessment of microscopy-based diagnosis of malaria in health facilities |
| 2001 | Intervention to train clinical officers and lab technicians |
| 2002 | Planned assessment |

## Using Problemsolving Teams to Improve Health Workers' IMCI Performance

A 1998 case study of health workers' performance at 38 health facilities in Bungoma and Vihiga, conducted by the Quality Assurance Project in collaboration with AMREF and the DHMT, found serious deficiencies in the execution of IMCI guidelines. For example, fewer than 10 percent of children received a complete assessment, and fewer than 20 percent were correctly classified as having severe, moderate, or mild illness. Many health workers "expressed high frustration performing IMCI, which they found to be very complex and time-consuming" (Lin and Tavrow 2000). Most health workers also reported that drugs and supplies needed for IMCI were often not available.

BDMI tested the use of problemsolving teams at health facilities as a way of providing more support to health workers in implementing the IMCI approach. The Quality Assurance Project had used problemsolving teams in other countries to improve quality of care. In Kenya, health facilities with IMCI-trained staff were chosen in August 1998, and 21 of the 35 facilities were randomly selected to receive team instruction. Supervisors were trained in team-building and coaching. Coaches set up teams from November 1998 to August 1999, but given transportation problems, additional coaching was provided only sporadically.

An evaluation in March 2000 found that there had been a significant improvement in IMCI case management, based on a composite of data on the four IMCI management aspects (assessment, classification, treatment, and counseling). Improvement varied from under 15 percentage points in facilities with no teams to over 50 percentage points in facilities with teams. There was some variation with all facilities showing improvement (regardless of the presence of a team), and only those facilities with teams showed significant improvements in correct classification. None of the teams showed any significant improvement in correct treatment. During the evaluation, teams were also assessed using a case study exercise and by whether they had implemented at least two solutions. Six of 21 teams were determined to be "higher-ability" teams, and were also found to have a higher point improvement (over 75 points) in IMCI management than did the "lower-ability" teams (just over 50 points). Higher-ability teams showed significant improvements in counseling. The estimated cost of setting up and maintaining a problemsolving team for one year was $424, an amount that the DHMT considered affordable (Tavrow et al. 2000; Tavrow et al. 2001).

**Lessons Learned: Problemsolving Teams**

- Implementing problemsolving teams at health facilities appears to be an effective strategy for improved IMCI classification and counseling.

  The following lessons are taken from an assessment of team problemsolving that was designed to improve IMCI performance among health workers, who had been trained in IMCI guidelines. These lessons are about performing a quality assessment. According to Lin and Tavrow (2000: 9),

- The quality assessment process provided an impetus for district- and facility-level problemsolving;
- The DHMT's participation in the assessment process ensured local commitment to improving IMCI performance. This participation included planning and pretesting, training assessors, conducting the assessment, discussing and analyzing the results, setting priorities, and so on;
- Quality assessment focuses providers' attention on their skills, and makes them feel that their work is important, especially at small, remote facilities;
- The methodology for quality assessment needs to be continually adapted and refined; and
- Using skilled IMCI trainers as assessors helped to ensure data quality.

## IMCI Supervision

### Before BDMI

During the initial planning phase for IMCI's implementation, the expansion of district-level IMCI supervision was identified as an important strategy for addressing barriers to good health worker performance. District-level IMCI supervision began immediately after the first IMCI training course. One of the achievements of the CDC and DHMT's collaboration in 1996 and 1997 (prior to BDMI) was the development of an IMCI checklist and methodology for supervisors. The process included observing a consultation, repeating the assessment, interviewing the caregiver, reviewing mistakes and omissions with the health worker, and using the checklist for monitoring projects. Supervisors who were trained in using this method were responsible for conducting on-site problemsolving, and served as agents for communicating with the DHMT and district officials.

Although supervisory visits were initially scheduled to occur every month, time and transportation constraints limited visits to every two months. The district tried integrating IMCI supervision with ongoing DHMT supervision, which involved supervisors from multiple disciplines and occurred at most every four months. The study found that linking IMCI supervision with DHMT supervision led to many aborted visits and to failure to observe health workers' case management. Visits were often delayed or canceled because of the difficultly of coordinating multiple schedules. Further, DHMT supervision was scheduled during afternoon hours, while most sick children present to facilities during the morning.

### BDMI Intervention

Separate IMCI clinical supervision continued throughout the BDMI project, but not to the extent originally planned. No supervisory visits were conducted between October 1, 1998, and April 4, 1999. Only 65 percent of the supervisory visits planned for the period between April 1999 through September 1999 were completed (Ngugi 1999), so health workers did not benefit from supervisory support to the extent anticipated.

Forms collected during supervision were analyzed to monitor health workers' and supervisors' performance. Data collected during 1998 and 1999 suggested some improvement in performance compared to the performance of IMCI-trained health workers in the 1997 health facility survey. There were marked improvements in classification of severe illness (51 percent correctly classified in 1998-99, compared to 21 percent in 1997), some dehydration (83 percent correctly classified in 1998-99, compared to 14 percent in 1997), and anaemia (59 percent correctly classified in 1998-99, compared to 18 percent in 1997). There were some improvements in treatment of illness: 70 percent of children with severe illness were correctly treated in 1998-99, compared to only 48 percent in 1997. However, among children with some dehydration, the percentage correctly treated fell from 71 percent in 1997 to 50 percent in 1998-99. In addition, the supervision data indicated that health workers who had identified children as being severely ill referred only 36 percent of those children (Herman 2001). These results continue to be less than optimal. They also may not reflect actual practice, since health workers tend to take more time with children during observation by a supervisor.

The supervision forms showed that the health workers performed between 92 percent and 98 percent of the assessment tasks (history and physical exam components) needed to identify children with severe illnesses. Thus, performance of assessment tasks was not a problem. It was not possible to determine whether health workers made errors in interpreting the assessment tasks (such as failing to recognize chest indrawing or stridor), processing the findings to arrive at a classification, or both. It was also unknown how often health workers arrived at the correct classifications but made conscious decisions not to follow the IMCI guidelines when assigning classifications to or treating the children.

The supervisors also made mistakes in processing their findings. Of 37 severe classifications occurring in 28 children, supervisors failed to take the presence of a general danger sign that they had identified into account when assigning a classification to three of those children, thereby missing three severe classifications. These errors underscored the importance of introducing a system of checks and quality control in the supervisors' work, as well as in that of health workers.

In January 2001, eight additional supervisors were recruited to help out the two supervisors who had been responsible for all IMCI supervision visits in Bungoma since 1998. The supervisor pool was expanded to allow for supervision at each facility on a quarterly basis, and to permit supervisors to pair up and review each other's forms before leaving the facility. The supervisors helped update the IMCI supervision form to make it consistent with the Kenyan version of the IMCI guidelines. The form was also revised to allow caregivers' responses to the health workers' questions to be recorded, as well as to include health workers' stated or recorded findings. All supervisors participated in a week of supervision training and concordance testing.

The Kenyan adaptation of the IMCI guidelines calls for follow-up visits after training, using forms developed by WHO/UNICEF. The follow-up visits involve the same procedures previously used by the IMCI supervisors in Bungoma. In January 2002, in order to be consistent with the national program, all supervisors were retrained, using the

WHO/UNICEF forms and methodology. These forms are now being used for ongoing IMCI supervision visits, and have replaced those originally designed by the DHMT and CDC.

The midterm review of BDMI recommended that the DHMT institute a central system for clinical supervision, possibly involving sending health workers to a central location, such as a hospital with a high case volume, several times a year. A more centralized supervision system may not be feasible, because nurses at Kenyan hospitals are not officially permitted to see sick children or to dispense drugs (although in actual practice they apparently do, as well as carrying out these duties at health centers and dispensaries). In addition, the logistics and travel costs may be too onerous for health workers from rural health facilities that are far from the district hospital. Assuming that vehicles and field allowances for supervisors will not be continued once BMDI ends, the DHMT might want to try to implement a central system for supervision.

### Addressing Persistent Deficiencies in Health Workers' Performance

There is evidence that problems in identifying children with severe illness are not unique to Bungoma. In a study conducted in 14 health facilities in Uganda, 18 IMCI-trained health workers made errors in using their own findings to arrive at classifications in 20 percent of severe illness classifications, including 32 percent of children with very severe febrile disease (Peterson et al. 2001). There was no external validation of the findings, so it is not clear to what extent the study's findings and classifications reflected the children's conditions. No trials to analyze or address this problem with implementing IMCI have yet been reported in the literature.

In July 2000, in an attempt to more clearly identify the problem in classifying and treating severe illness, BDMI conducted a rapid assessment of health workers' perceptions and knowledge. The assessment confirmed that health workers lack knowledge of IMCI criteria for classifying severe illness, have trouble remembering the criteria for classifying children with dehydration, do not consistently use the guidelines, do not routinely refer to existing job aids, and disagree with some parts of the guidelines. Thus, there is a problem with consistent use of the guidelines and with processing assessment findings to arrive at the correct classifications (Herman 2000).

The rapid assessment identified possible root causes for health workers' failure to use the IMCI guidelines effectively. The findings were consistent with the results of in-depth interviews with health workers in 1995, when lack of time, poor motivation, caregivers' and peers' expectations, inadequate feedback from supervisors, and lack of knowledge and skills were identified as the main causes of poor performance (CDC and USAID 1997).

In January 2001, representatives from all facilities in the district were invited to participate in a two-day meeting, during which the analysis of supervision visits and the results of the rapid assessment were presented. The purpose of the meeting was to develop a strategy for addressing problems with the classification and referral of severely ill children. The DHMT proposed the development and introduction of an IMCI clinical register/job aid. During the meeting, the participants helped to design the proposed register, and discussed issues and

procedures related to introducing the register in different types of facilities. Participants were also asked to suggest affordable incentives that might motivate health facility staff to support the consistent use of IMCI for evaluating sick children.

### Intervention to Improve the Management of Children With Severe Illness, Diarrhea, or Anaemia

In May 2001, as a result of the rapid assessment and of the decisions reached at the January meeting, the Bungoma DHMT began a randomized trial of three interventions to improve health workers' performance in implementing IMCI guidelines, particularly in the classification of severe illnesses, diarrhea, and anaemia (Herman 2001):

- Modification of the clinical registers currently used for recording sick-child visits in order to create IMCI clinical registers/job aids. The registers were designed to facilitate the performance and recording of IMCI assessment tasks, encourage health workers to follow the guidelines with every sick child, help them remember criteria for classification, and prompt them to check for and act on indicators of severe illness.

- Promotional site visits by senior members of the DHMT together with IMCI trainers. Such visits allowed the DHMT and IMCI trainers to meet with all health facility staff involved in implementing IMCI and to present the rationale behind and advantages of using IMCI guidelines. Questions about, problems with, and issues related to the use of IMCI were openly discussed.

- Introduction of facility-based incentives to encourage all staff to support the implementation of IMCI. Staff members were informed that all facilities would be evaluated by a health facility survey, and that the facilities demonstrating the most progress in correctly using the IMCI register and implementing IMCI would be awarded trophies, an awards party, and recognition throughout the district.

A fourth intervention, alternating the site of IMCI supervision between the health worker's assigned station and one of the district referral hospitals, was considered, but has not yet been implemented.

In May 2001, immediately after the promotional site visits to the 15 intervention facilities, the IMCI clinical registers/jobs aids were introduced and health workers were trained in their use. A follow-up visit was conducted about two weeks later to review entries in the registers, correct errors, and answer questions.

A review of register use and a formal analysis of 609 register entries in the 15 intervention facilities were conducted in July 2001, two months after the changes were introduced (Becknell 2001). Register use varied from facility to facility. The health workers in some facilities used the registers consistently, found them to be helpful job aids, reported that the registers enabled them to work more quickly and efficiently, and used the registers as tools to help with on-the-job training. Register use was minimal in the two hospitals in the

intervention group. DHMT members noted that register use was predictable, in that health workers in facilities with good IMCI implementation embraced them. Facilities that suffered from chronic management problems, including facilities that had performed poorly with other interventions (such as the problemsolving teams) or that were not following the IMCI guidelines routinely, did not use the IMCI registers consistently.

Register entries by 43 health workers were analyzed for internal consistency between the recorded assessment findings and the health workers' recorded classifications and treatments. This was essentially a chart review, so there was no gold standard against which to compare the health workers' findings. As indicated in Table 2, performance in classifying and treating children with severe illness was good, particularly for health workers who had received IMCI training, IMCI refresher training (on the Kenyan adaptation of IMCI), and training in use of the register. It should be noted, however, that the health workers who chose to use the registers probably represent those most motivated to use IMCI.

**Table 3**
**Health Worker Performance in Classifying and Referring Severely Ill Children Ages 2 to 59 Months**

| Health Worker Training Activities | Percent of severe illness classified correctly | Percent of severe illness referred correctly |
|---|---|---|
| All health workers | 84 | 78 |
| Health workers with IMCI and register training | 73 | 67 |
| Health workers with IMCI refresher and register training | 95 | 86 |

*Note*: Based on a review of IMCI register entries from June 11 through June 22, 2001. (*n* = 106 cases with severe classification, as determined from the recorded assessment findings)

In April 2002, the Bungoma District Health Facility Survey was conducted as part of the final evaluation of BDMI in all NG health facilities with IMCI-trained health workers. The various survey analyses planned are presented in Section 3, and should contribute to the evidence base on interventions to improve health workers' performance and care of sick children.

## Findings and lessons learned: Case management at health facilities

The potential of IMCI implementation. The implementation of the IMCI strategy was relatively well supported under BDMI. Implementation of the IMCI guidelines and their system support generally went as planned: IMCI case management courses were funded, vehicles were available for supervision visits, and field allowances were paid to the IMCI supervisors. Facilities received national drug kits and had appropriate cold boxes for storing vaccines. Although the drug supplies in the kits were not adequate to meet all needs, community pharmacies helped address the gaps. Further, the health center development committees of the health facilities received management and financial training.
Data from Bungoma's multiple evaluations of IMCI case management indicate that quality of

care can be improved given a reasonable level of support. Baseline studies showed that health workers treated in response to the presenting complaint, rarely doing physical exams or questioning the caretaker. Follow-up assessments showed that health workers performed over 90 percent of assessment tasks, an important change in health workers' culture and expectations. Improvements in the treatment of moderate and severe illness, although less than optimal, were both statistically and programmatically significant.

**Lessons:**

- Combining IMCI case management training with a reasonable level of supervision, support, and follow-up can improve IMCI implementation.

- Measures of quality of care that are documented through supervision data and health facility surveys probably represent the upper limits of performance. Health workers acknowledge that they do not follow IMCI guidelines with every sick child, and many acknowledge that their performance is different when they are not being observed.

*Limits to IMCI implementation*. The Bungoma data also demonstrate the limits to what can be achieved using the types of training and support provided by BDMI. Many health workers were motivated to implement IMCI because they felt that it would help them provide better care. Other workers, however, felt either that the quality of care achieved without IMCI was adequate or that IMCI would not improve the quality of care, or else they placed more value on seeing children quickly than on providing high-quality care. It was difficult to identify ways of promoting IMCI to health workers who were not motivated by its potential to improve quality of care. Similarly, it was difficult to identify affordable and practical incentives that could help facilities create an IMCI-friendly environment. One incentive scheme involved a competition between facilities, but unavoidable delays in conducting the final evaluation meant that there was an interval of a year between implementation of the interventions and feedback to facilities. The promise of recognition at some unspecified future time is unlikely to be an effective motivator.

**Lesson:**

- It may not be possible to improve IMCI's implementation beyond a certain point until there is a significant change in the expectation for, monitoring of, and feedback regarding quality of care, or until there is a link between performance and salary or benefits.

*Similarities in gaps identified in government and nongovernment facilities.* Baseline findings regarding quality of care were similar in government and nongovernment facilities. There is evidence that problems with overlapping prescriptions may be more common in nongovernment facilities.

*The challenge of training supervisors to support IMCI.* The Bungoma DHMT put considerable resources into training senior health facility staff in IMCI case management, since senior staff, as supervisors, would need to understand IMCI in order to support its

implementation. Problems sometimes occurred, however: In several facilities, there were many IMCI-trained health workers in the facility, but the supervisors did not assign them to see sick children. Thus, part of the expense of IMCI training was wasted, because many of those trained had no opportunity to use their skills.

*The role of medical officers.* Medical officers are generally assigned to hospitals and do not usually have outpatient responsibilities. They are responsible for the quality of care delivered in their facilities and are consulted for difficult cases. Ideally, they should be familiar with IMCI so they can understand the evaluation of children referred to them and to support outpatient staff. However, medical officers seldom accepted invitations to IMCI training, stating they could not be away from their stations for the 11-day training. Further, the manner or extent to which they are expected to use the IMCI guidelines in their own work is unclear.

**Lessons:**

- Given the cost of IMCI training, alternative methods for orienting senior staff to IMCI may be more appropriate than an 11-day training course.

*Effectiveness of IMCI supervision.* Although IMCI supervisory activities did not occur as frequently as planned, systematic on-site supervision (that included the observation of health workers seeing sick children) remained a priority. The IMCI trainers and supervisors felt that the improvements in case management achieved through IMCI implementation could not have been maintained without clinical supervision. The effect of supervision cannot be measured directly because there was no unsupervised control group. The 2002 health facility survey will show whether the frequency of supervision affected performance.

**Lesson:**

- IMCI trainers and supervisors consider on-site clinical supervision an important part of improving implementation.

*IMCI implementation in the hospital setting.* IMCI implementation in hospitals was particularly challenging. First, workers and supervisors seemed to feel that IMCI was not appropriate or necessary in settings in which labs and x-rays were available. Second, although nurses are not allowed to write prescriptions in the hospital setting (and children presenting to hospital outpatient settings are supposed to be evaluated by a clinical officer), priority was given to wards and specialty clinics when assigning clinical officers, leaving nurses in the uncomfortable position of being asked to evaluate and treat in the pediatric outpatient department when they were not authorized to do so. Further, hospital policies required that patients go to a central pharmacy (often in a different part of the facility) for drugs. In smaller facilities, drugs were usually dispensed by the health worker seeing the child or from a pharmacy near the consultation room. Because pharmacies and offices in hospitals were physically separated, many caregivers left immediately after obtaining drugs from the pharmacy. This interfered with the flow of IMCI and with counseling on the administration of medications.

**Lesson:**

- Hospital policies, such as those prohibiting nurses from writing outpatient prescriptions or requiring that patients go to a central pharmacy, can thwart improvements in implementing IMCI.

## Potential Finding and Recommendations

*Strategy for upgrading health workers who are not IMCI-trained.* Although BDMI put considerable resources into IMCI case management training, the initiative has not yet achieved its target of training 60 percent of health workers who see sick children. Part of the problem is that health workers are frequently transferred to other districts. The midterm review of BDMI and the work of the problemsolving teams, assisted by QAP, indicated that on-the-job training in IMCI might be helpful. Some facilities embraced the idea; some of the health workers who received such training performed well during the 2002 health facility survey. The performance of workers who have received on-the-job training will be formally evaluated in the analysis of the 2002 survey. If the results are promising and if some support for IMCI in Bungoma were to continue, the district could consider a pilot test of training guidelines and certification of on-the-job training.

The midterm review also recommended preservice training, which has still not been implemented in Kenya. Two important steps are required: The training curriculum needs to be revised to include IMCI case management, and lecturers need to be trained in IMCI.

## Improving Microscopic Diagnosis of Malaria

The use of microscopic diagnosis of malaria is another component of case management that is being addressed under BDMI. An assessment conducted in 1999 found that about 70 percent of patients with fever and 40 percent of those without fever were referred for malaria microscopy (Barat and Kramer 1999). Clinicians used blood slide diagnosis more than twice as often as temperature measurement as a diagnostic tool. Two-thirds of children under age 5 with fever were referred for blood slide examination, even though the IMCI guidelines for fever do not recommend the use of microscopic diagnosis for outpatients in health facilities. When microscopy was used for diagnosis, antimalarial drugs were prescribed frequently, often inappropriately. Some patients were given two or more antimalaria drugs, despite the GOK's recommendation of monotherapy. Of patients whose blood was examined under a microscope, 38 percent of those without a fever and 65 percent of those with a negative blood slide were prescribed antimalarial treatment, suggesting that the value of laboratory microscopy for diagnosis and treatment of malaria is compromised by current practices.

Based on the assessment findings, the study team recommended that clinical guidelines for the effective use of blood slide microscopy for outpatient management of fever be developed and that clinicians be trained in these guidelines. CDC staff subsequently prepared the guidelines (Herman 2000). The assessment also called for ongoing supervision of laboratory technicians, to identify problems with supplies, equipment, and facilities; ensure accurate

readings of blood slides; and provide feedback to laboratory staff on their performance and their training needs. BDMI trained 57 clinical officers and lab technicians in 2001. Technicians were updated on clinical and laboratory microscopy of malaria and other endemic diseases through two training courses, each lasting two weeks. They also received training in case management, recordkeeping, and lab management, including safety practices. But while training did occur, other interventions, such as the recommended supervision, apparently did not. CDC staff has questioned whether training of laboratory staff would yield much improvement if other inputs were not in place (Herman and Deming 2002). A follow-up assessment of health workers' performance on diagnosis and laboratory microscopy is planned for the final months of BDMI.

## 2.2 Case Management at Home and in the Community

Prompt, effective treatment of malaria in sick children is part of effective case management, whether performed by health workers in health facilities or by caretakers in the home. It is now widely recognized that many sick children, including those who die from malaria, are never taken to formal health facilities (Meek et al., 2001). Given this reality, more attention has been given to reaching consumers (especially caretakers) and involving the private sector (including drug vendors). The objective is to educate the caretakers to recognize malarial illness, so that appropriate treatment can be given sooner and can reduce the associated illness and death.

The following section describes sets of activities conducted under BDMI for improved case management at home and in the community. The first set deals with the work by DHMT, BASICS, QAP, and AMREF to improve drug outlets' prescribing practices. The second and third are extensions of that work. The fourth set of activities, which focuses on key community practices, is being implemented by the DHMT and AMREF. Box 6 presents a timeline for each of these sets of activities.

The 1996 baseline household survey was the starting point for efforts to improve the care of sick children in the home and community. The survey found the caretakers are "major and prompt providers of antimalarial treatment" (Hamel et al. 2001). About 47 percent of febrile children were treated at home with an antimalarial drug (32 percent received their only antimalarial treatment at home), 43 percent were taken to a health facility, and 25 percent were neither treated at home or taken to a health facility. Of antimalarial treatments given at home, 91 percent were started by the second day of fever. Many caretakers gave incorrect dosages, a common problem with chloroquine, which was the preferred treatment at the time of the survey.[6] Although home treatment was prompt, the issue of incorrect treatment would need to be addressed in any effort to improve home treatment practices. The survey also found that most antimalarials used for home treatment were bought either from pharmacies or small shops.

[6] At the time of the study, chloroquine was still the recommended first-line treatment and was the most commonly administered home treatment. Because it requires three doses, chloroquine was considered more complicated to administer properly than sulfadoxine-pyrimethamine, a single-dose medication that later became the recommended first-line treatment.

**Box 6. Timeline of Major BDMI Activities for Case Management at Home and in the Community, 1998-2002 (presented as sets of activities and interventions)**

| *Date* | *Activity or Intervention* |
|---|---|
| | **Set 1: DHMT, BASICS, QAP, and AMREF** |
| 1998 | Qualitative study of caretakers' care-seeking behavior |
| 1998 | Baseline study of potential drug outlets |
| 1999-2000 | Vendor-to-vendor education<br>• Training of wholesale drug venders<br>• Use of job aids for shopkeepers and clients |
| 2000 | Evaluation of vendor-to-vendor education |
| | **Set 2: DHMT, QAP, and AMREF** |
| 2001-2002 | Strengthening vendor-to-vendor education<br>• Development of "how-to" manual for intervention<br>• Refresher training of previously training vendors<br>• Training of new vendors |
| 2002 | Planned evaluation |
| | **Set 3: DHMT, QAP, and AMREF** |
| 2002 | Jirani-kwa-jirani (neighbor-to-neighbor) education<br>• Public health technicians' training of community members<br>• Dissemination of comic book containing messages on malaria treatment |
| 2002 | Planned evaluation |
| | **Set 4: DHMT and AMREF** |
| 2001 | Baseline assessment on key practices for community IMCI |
| | Community IMCI (CIMCI)<br>• Training of community-owned resource persons<br>• Use of simplified malaria guidelines<br>• Establishment of district CIMCI committees |
| 2002 | Planned assessment |

## Improving Prescribing Practices Through Vendor-to-Vendor Education

A qualitative baseline study on care-seeking behavior among caretakers whose children were suffering fever and convulsions, carried out under BDMI in 1998, provided additional insights into home management of sick children (Baume et al. 1998). The results helped explain why key behaviors did or did not occur. Caretakers visited pharmacies or small shops in rural areas to obtain antimalarials and antipyretics because they "have experience from a prior illness and base their treatment on what a health facility recommended or what has

worked in the past" (Baume et al. 1998: 14). Many caretakers found that pharmacies were more conveniently located than health facilities, and saw no special advantage of going to a health facility, since such visits could be costly and require a lot of time and money.

Given the importance of drug outlets for home treatment of sick children, BDMI supported a baseline study of the existing private drug outlets (pharmacies, shops, kiosks, and private clinics) in Bungoma (District Health Management Team 1998). The study found that small rural pharmacies and shops were the main source of drugs in rural areas, and that larger pharmacies (as well as shops) were more important in urban areas. Most rural shops purchased their drugs from wholesale general shops, although some got their supplies from mobile drug vendors and wholesale pharmacies. Pharmacies in urban areas typically obtained their drugs from wholesale pharmacies (Tavrow 2002). If drugs were purchased from a pharmacy, the pharmacist or pharmaceutical assistant usually provided advice. In shops, no special advice was provided to the client. Drug distributors were very knowledgeable about types of antimalarial and antipyretic drugs, but the staff of most drug outlets did not know enough about drug dosages. Further, staff of pharmacies and private clinics observed that noncompliance with an antimalarial treatment regimen by patients was a major problem.

To address the knowledge gaps about appropriate malaria treatment by staff at private drug outlets, BMDI tested a low-cost outreach education strategy, vendor-to-vendor education (Tavrow et al. 2002).[7] The objective of the intervention was to improve private drug retailers' compliance with Kenya's national malaria treatment guidelines. There were two key parts of the strategy: training wholesale drug vendors to communicate the new malaria guidelines to drug retailers, and use of job aids for shopkeepers and clients (both job aids are posters).

The DHMT and Quality Assurance Project staff conducted individual interviews with private drug outlets and wholesalers to determine both the suppliers' and the public's perceptions and concerns about treating malaria with sulfadoxine-pyrimethamine (SP) and about problems in providing treatment (such as inability to pay for the complete dose). The researchers developed an orientation session for wholesale owners and a one-day training session for mobile vendors and attendants at wholesale pharmacies and shops. These trainees, in turn, were to give retailers and shopkeepers, who got their supplies from these vendors, information on proper malaria treatment, as well as job aids to reinforce this information.

An evaluation using supervisors and mystery shoppers showed a significant improvement in malaria knowledge and prescribing practices among private drug outlets that had received the job aids, compared to drug outlets that had not received job aids. To measure changes in knowledge among shopkeepers and pharmacy retailers, supervisors administered a 10-question quiz about malaria and its treatment (for example: True or false: Fansidar is a single-dose treatment). Staff at the intervention drug outlets scored significantly higher than

[7] In 1996, a forerunner to the vendor-to-vendor strategy, a training program for shopkeepers, was carried out in Kilifi, a rural area of coastal Kenya. The program included baseline assessments of shopkeepers' and home caretakers' knowledge, attitudes, and practices about malaria ; training of shopkeepers; and two post-training evaluations. Results showed significant improvements in the appropriate dosage and use of antimalarial drugs by shopkeepers and community members (Marsh et al. 1999). The approach trained shops' owners, reaching very few drug sellers. BDMI chose a different strategy in order to reach more drug sellers more cost-effectively.

control outlets on seven of the 10 questions (83 percent of those at intervention outlets knew that Fansidar is a single-dose treatment, compared to 65 percent of those at control outlets).

The evaluation showed that amodiaquine (AQ), which is the second-line drug, was the most popular drug stocked (perhaps because it has a higher profit margin), while the MOH's current first-line drug, sulfadoxine-pyrimethamine, was stocked by many fewer outlets. Of the antimalarials sold, AQ was purchased by 50 percent of mystery shoppers, and SP by another 23 percent. Shoppers were much more likely to receive advice about the correct dosage for SP than for AQ, perhaps because SP, a single-dose treatment, is easier to understand and explain than AQ's multiple doses. For example, 63 percent of mystery shoppers who purchased SP were told the correct dose, compared to only 24 percent of shoppers who purchased AQ. Comparisons of intervention and control outlets showed that 17 percent of mystery shoppers at intervention outlets who purchased SP and an antipyretic were told the correct dosage, compared to less than 2 percent of mystery shoppers at control outlets. Further, the vendor-to-vendor strategy appears to be an effective way to reach small, dispersed outlets relatively cheaply: After six months, nearly 500 outlets had been reached, at a price of about $17 per outlet. Although the evaluation showed some improvements in prescribing practices, most retail outlets were still not complying with MOH malaria guidelines, in that SP was not the most commonly stocked nor the most frequently sold drug.

The vendor-to-vendor intervention showed potential for addressing one cause of inappropriate treatment of malaria in children in that it increased the number of vendors who give correct advice and dosages of antimalarial drugs. The intervention assumes that better prescribing practices will improve client compliance with treatment, and is considered an important step toward improving treatment. Ultimately, caretakers' compliance with treatment regimens for sick children should be assessed directly. Improvement of treatment behavior in the home is one of the outcome measures for BDMI.

Antimalarial products available through drug outlets in Bungoma do not include a dosage that is suitable for use by children. The National Malaria Coordinating Committee is working to have a dosage appropriate for children provided by pharmaceutical companies. On a related matter, BDMI successfully persuaded the manufacturer of Malaratab, the most popular brand of amodiaquine, to correct the dosage information that appears on the drug's label.

### Extending the Vendor-to-Vendor Education Program

Efforts to strengthen the vendor-to vendor program include the following:

- A How-to Training Manual. A manual that explains each step of setting up the vendor-to-vendor intervention; and

- Training of Vendors. Refresher training of vendors already participating in the program and training of new vendors.

Given the initiative's promise for improving malaria knowledge and prescribing practices among private drug outlets, QAP and AMREF have recommended that the National Malaria Control Program in Kenya expand the strategy to all areas where malaria is endemic. A June 2002 workshop on the findings of the vendor-to-vendor and the Neighbor-to-Neighbor interventions (see below) is planned.

### Increasing Community Demand for Correct Drug Treatment

As a complement to the vendor-to-vendor program, which deals mainly with improving the supply side of effective malaria treatment, BDMI is supporting another intervention. The jirani-kwa-jirani (neighbor-to-neighbor) intervention is aimed at increasing community demand for correct drug treatment. The intervention is a community education program, led by public health technicians (PHTs), that encourages people in villages to convey messages about malaria to each other. Each person trained by a PHT is supposed to teach five other people the messages, with the assistance of job aids (brochures) explaining the messages in an easy-to-understand comic-book format. The effect of the first round of messages is being tested in 150 villages (see Box 7). If the activity proves effective, it may be extended to other villages or incorporate other messages, such as promoting the use of bed nets. An evaluation of the intervention is planned.

**Box 7. Messages for the Neighbor-to-Neighbor IEC Community Campaign**

Tell your neighbors:

Ask for sulfadoxine-pyrimethamine drugs, like Orodar, Falcidin, or Fansidar.

- They are the right treatment for malaria.
- They are safe for everyone, even young children.
- They are good value, since you only have to take them one time.
- Take with Panadol.*
- A child can die quickly if not treated correctly.
- If a child does not get better with treatment, take the child to a doctor at once.

***The common term for paracetamol taken for fever.**
**Source: Waverly, 2002.**

### Improving Household and Community Practices

In 2001, BDMI embarked on a community-based intervention, Community IMCI (CIMCI), to improve household and community practices for child health. The intervention began with a baseline survey of 306 households to identify current key practices and behaviors among caretakers of young children. The survey obtained information on 16 practices that contribute to child survival and healthy growth. The survey found that, after trying home remedies, 63 percent of caretakers took their children for treatment, mostly at government facilities, and

the remaining 37 percent did not seek outside care. Not quite half of respondents (47 percent) sought care within the recommended one hour to 24 hours, although 53 percent delayed seeking treatment until more than 24 hours after the onset of fever. The survey also showed that 90 percent of respondents considered high fever an important danger sign that would lead to an immediate visit to a health facility. In terms of disease prevention, however, only 13 percent of women reported that they had taken the required two doses of SP during their pregnancy. About 18 percent of mothers reported that they had slept under a mosquito net during pregnancy; only 29 percent of those nets had been treated with an insecticide (Ngugi et al. 2001).

Following the baseline survey and a needs assessment, BDMI began supporting the development of training materials for health workers (training-of-trainers) and simplified guidelines for Community-Owned Resource Persons (CORPS) on all key practices and behaviors. The simplified malaria guidelines were developed by the national, provincial, and district levels of MOH, with support from USAID through CDC Kisumu. Training on CIMCI has been carried out. A district CIMCI committee has been established, and includes members from a wide range of institutions, departments, and ministries.[8] BDMI is also planning to assess the results of CIMCI and prepare a report on lessons learned by September 2002.

## Lessons Learned: Household and Community Practices

- One lesson reconfirmed is that case management of sick children at home and in the community must be an integral part of any strategy aimed at improving child health and survival, because most children are treated at home, and many never are taken to a health facility.

- Training, motivating, and equipping mobile vendors and attendants at wholesale drug counters to communicate malaria guidelines to retailers appears to be an effective way to spread the message to small, dispersed outlets at a reasonable cost.

- Jobs aids (posters) that address the concerns and issues facing small retailers in complying with national malaria guidelines, written in a language that retailers can understand, seem to have significantly improved their compliance with the guidelines.

[8] Membership includes: the DHMT; the District Health Management Board; the Bungoma County Council; the Bungoma Catholic Diocese; the Bungoma Anglican Church; the Nzoia sugar factory; the Lugulu Hospital; the Departments of Water Development and Social Services; the Ministry of Education; the Ministry of Social Services; the Ministry of Water; the Ministry of Agriculture; the Provincial Administration, Maendeleo ya Wanawake, and AMREF.

## 2.3 Management of Malaria During Pregnancy

Malaria infection during pregnancy is a cause of maternal morbidity (particularly anaemia) and mortality, and contributes to infant morbidity and mortality. Because of the importance of preventing infection during pregnancy, the Kenyan MOH changed its national malaria treatment policy in 1998. The revised policy, consistent with current WHO recommendations for malaria prevention for all pregnant women, calls for intermittent preventive treatment with sulfadoxine-pyrimethamine for pregnant women living in malaria-endemic areas.

BDMI activities for preventing malaria during pregnancy include three different components (see Box 8): one through antenatal clinics, one involving traditional birth attendants (TBAs), and a third that is actually a subset of an intervention discussed in section 2.4.

**Box 8. Timeline of Major BDMI Activities for Management of Malaria in Pregnancy, 1998-2002 (presented as sets of activities and interventions)**

| ***Date*** | ***Activity or Intervention*** |
|---|---|
| | ***CDC, DHMT, and AMREF*** |
| 1998 | Baseline study of malaria in pregnancy in lower transmission season; qualitative study of traditional birth attendants, health workers, etc. |
| 2000 | Baseline study of malaria in pregnancy in higher transmission season |
| 2001 | Intervention to promote use of SP at antenatal clinics:<br>• In cost of antenatal services<br>• Separate supply of SP provided to health facilities for IPT<br>• Training of nurses in antenatal care, including IPT with SP<br>• Community education on IPT with SP |
| 2002 | Planned assessment |
| | ***AMREF and DHMT*** |
| 2001 | Assessment of TBA services and skills |
| 2002 | Intervention to improve quality of antenatal care provided by TBAs<br>• TBA training curriculum revised<br>• Training of TBAs in antenatal care |
| 2002 | Planned assessment of TBA training |
| | ***AMREF and DHMT*** |
| 2001-2002 | Promotion of use of ITNs at antenatal care clinics (ANCs); beginning in 2002, subsidized distribution at ANCs |
| 2002 | Planned assessment of ITNs at ANC clinics |

## Promoting Use of Sulfadoxine-Pyrimethamine at Antenatal Care Clinics

The 1996 baseline household survey conducted in Bungoma District found that 91 percent of pregnant women made at least two antenatal visits to antenatal clinics, and suggested that intermittent SP therapy might help prevent malaria infection in pregnancy. To prepare for adoption and implementation of the policy, BDMI supported research to examine the extent of the malaria in pregnancy and the potential for intervention within the existing antenatal care system. The research has helped to identify social and behavioral factors that influence acceptance and use of such services and has helped determine the feasibility of providing such services.

BDMI supported two baseline studies to assess the extent of malaria during pregnancy, the level of services provided at antenatal care clinics, and women's attitudes about antenatal care and malaria prevention (Williams and Mungai 1999; Mungai and Parise 2000). During seasons of lower transmission, the peripheral parasitemia rate during pregnancy was 20 percent, and the placental parasitemia rate was 9 percent, with first-time mothers having the highest rates. During the higher transmission season, peripheral and placental parasitemia rates at delivery were 26 and 19 percent respectively (with both rates as high as 35 percent and 28 percent for peripheral and placental parasitemia, respectively, among first-time mothers).[9]

Other important findings from these studies were that anaemia and low birth-weight babies were common problems, especially among women pregnant for the first time. Further, although 37 percent of pregnant women were found to have anaemia, less than a third of them received iron or folic acid supplements. Health workers and clients cited numerous barriers to good quality care. Barriers identified by health workers included a lack of reliable communication and transportation for patient management and referral, and a shortage of supplies. Barriers to quality antenatal care from the clients' perspectives included health workers' poor attitudes, long waiting times, and the cost of transportation to reach health facilities. Traditional births attendants (TBAs) were also seen as playing an important role in antenatal care, although they lacked support from health facilities and their own communities. The studies also showed that most women began seeking antenatal care in the second trimester; among those who delivered their infants at health facilities, 86 percent had attended antenatal care at least once. These findings supported the idea that administering intermittent two-dose SP prophylaxis during antenatal care was feasible.

The research was carried out prior to MOH training of health workers on the new intermittent preventive treatment policy, so it was not surprising that most health workers had little understanding of malaria prevention, how prophylaxis differed from treatment, or the new MOH policy on intermittent preventive treatment. It was also not surprising that most pregnant women did not take SP therapy.

[9] Women pregnant for the first time are more vulnerable to malaria infection and tend to have higher parasitemia rates than do those who are pregnant for the second or more times.. In addition, pregnant women are susceptible to two kinds of infection, peripheral and placental parasitemia. Peripheral parasitemia relates to infection in the mother and is associated with risks of anaemia, while placental parasitemia can harm the fetus (with associated risks of low birth weight, shorter gestation, etc.).

In planning the implementation of the intermittent preventive treatment, BDMI focused on two major obstacles that had been identified in the baseline study (Mungai and Parise 2000): Health workers' reluctance to use their limited SP stock for malaria prevention (rather than treatment), and women's reluctance to pay for SP for prevention.

As a result of these obstacles, two trial solutions have been put into place: The first folds the cost of SP into the charge for an antenatal services card (and thus the cost of antenatal services), which costs 20 shillings, or about 3 cents; the second provides a separate supply of SP to be used for intermittent preventive treatment (Herman 2002). To carry out these initiatives, "seed" SP was given to health facilities to establish a revolving fund. Even with these changes, however, SP coverage among pregnant women was still low (fewer than 10 percent of women had received two doses of SP). Follow-up discussions with health workers revealed that they did not understand how and when to administer SP, and that pregnant women were not willing to purchase antenatal cards. They only came to antenatal clinics for services that were provided free.

Two other trial solutions are part of this effort.

- Training nurses on antenatal care practices. To address the continuing obstacles, DHMT staff has held brief training sessions to educate health workers about the schedule for SP and to answer concerns about its administration. A total of 300 health workers (nurses, clinical officers, and public health and nutrition personnel) have been given orientation training in IPT with SP.

- Community education. Presentations designed to educate the community members, especially husbands, about the importance of getting the recommended services by paying for antenatal card are being planned, and would be held at village meetings or health facilities. Additional support to implement this strategy on an adequate scale will be needed.

An assessment of this intervention is planned for mid-2002.

### Improving the Role of Traditional Birth Attendants in Antenatal Care

Given the potential role of TBAs in managing malaria in pregnancy, BDMI fielded a study to assess TBAs' services and skills in antenatal care (MABS 2001). In Bungoma, TBAs were seen as an integral part of the health system, even though there was no formal support of their work or a referral system between them and other health providers. Most TBAs lacked skills that would have enabled them to provide quality antenatal care, and some of their practices were unsafe. While training had been provided to some TBAs, the lack of follow-up or refresher courses limited their retention and use of new skills.

BDMI has supported the revision of the TBA training curriculum, which was first prepared in 1991. In the final phase of BDMI, TBA training materials are being pretested, and a new national training curriculum will be produced. Materials for training trainers are also being

prepared. Starting in June 2002, 450 TBAs from 15 health facilities (30 per facility) will participate in training and an assessment is planned for late 2002.

### Promoting Use of ITNs by Pregnant Women

Another preventive strategy, promoting the use of insecticide-treated bed nets (ITNs) by pregnant women, was recommended not only in the 1996 baseline household survey in Bungoma but also in the 1998 and 2000 studies. The 1998 study found that few pregnant women in Bungoma District used bed nets (22 percent of pregnant woman reported using a bed net at least once a week, and about 16 percent reported daily bed net use). The cost of the nets was found to be a barrier. The following Section (2.4) discusses this strategy in more detail.

While ITNs' efficacy is still not fully established (Meek et al. 2001), WHO recommends that "all pregnant women use a combination of both chemoprophylaxis or intermittent presumptive treatment, and insecticide-treated bed nets" (Meek et al. 2001: 59). Beginning in 2001, Kenya's National Malaria Strategy called for ITNs to be provided for free to pregnant women—assuming sufficient funding would be forthcoming from donors under the Roll Back Malaria Initiative.[10]

A pilot intervention on bed-net promotion at antenatal clinics ("antenatal plus") was planned for the final phase of BDMI's implementation, but was not carried out. The intervention would have promoted use of bed nets among pregnant women making visits to health facilities for their antenatal check-ups and delivery, and also among women visiting clinics for postnatal consultations and infant vaccinations (Deming 2001). Although the pilot is not being carried out by BDMI, such interventions are being implemented in Benin and Malawi under USAID's African Integrated Malaria Initiative, and may yield some lessons about the potential usefulness of the antenatal plus approach relative to BDMI's community-centered approach (Deming et al., draft protocol, 2002; and Deming 2002).

In lieu of the antenatal plus intervention, some health facilities are being used as outlets for distribution of ITNs: 18 of 51 ITN outlets were set up in health facilities. Beginning in January 2002, BDMI started subsidizing the cost of ITNs, and an assessment of the impact of subsidization is planned for October 2002.

In addition to the above activities, BDMI has supported the use of IEC materials on use of SP and ITNs by pregnant women. A number of IEC materials, including posters, leaflets, and brochures, have been developed and distributed to health facilities and communities.

[10] To help implement this strategy, UNICEF provided funding in 2001 for 70,000 nets and insecticide treatment (KO-Tabs) for use by pregnant women in 35 districts. Despite initial positive reports, the effectiveness of the distribution to antenatal clinics has not met expectations, according to USAID/Kenya staff.

Lessons Learned: Intermittent Preventive Treatments

- Implementing intermittent preventive treatments requires an integrated, multilevel approach; it is not enough to simply train health workers.. The issues of drug supply, systems support, and community buy-in must be addressed simultaneously.

- Implementing an intervention such as intermittent preventive treatment should be an iterative process, in which anticipated problems are addressed through pilot interventions, the results are assessed, and new trial solutions are devised and tested.

It would be premature to draw other lessons from BDMI's work in managing malaria in pregnancy, since the interventions only began in October 2001.

## 2.4 Use of Insecticide-Treated Materials

The evidence from various trial interventions strongly supports the use of insecticide-treated nets (ITNs) as a major tool for improving child survival (Meek et al. 2001). It is also generally understood that ITNs can be a cost-effective alternative to other vector control methods, which require specialized equipment, technical expertise, a large workforce, and widespread application of chemicals (Olenja et al. 2000). Thus, the greatest challenge for malaria control programs is not whether to support the provision of ITNs, but how to implement and finance strategies to ensure the maximum coverage and equity (Guyatt et al. 2001).

In the 2000 Abuja Declaration on Roll Back Malaria in Africa, African leaders resolved to ensure that at least 60 percent of those most at risk of malaria (pregnant women and children under age 5) sleep under insecticide-treated bed nets by the year 2005 (Shane 2001). For Kenya, this will involve raising the rate of use from around 10 percent to 60 percent. Leaders also pledged to reduce or waive taxes and tariffs on mosquito nets and insecticides. In Kenya, GOK taxes on mosquito nets and insecticides accounted for about 45 percent of their cost, so waiving the tax would make ITNs much more affordable.[11]

The MOH Division of Malaria Control recommended that ITNs be part of the National Malaria Strategy. Launched in April 2001, the strategy involves providing nets and insecticides through existing antenatal care services. The ITN strategy recognizes that the GOK does not have the resources "to protect everyone with an insecticide-treated bed net who is at risk of malaria without significant donors support" (Guyatt et al. 2001: 8). While the MOH has incorporated ITNs into its malaria control programme, results from BDMI may help the MOH implement this part of the strategy more effectively.

The 1996 household baseline survey provided information on bed net use in Bungoma. Only 5 percent of children under age 5 slept under a bed net. In households where at least one bed

[11] The government of Kenya has reduced taxes on imported ready-made mosquito nets, but a 20 percent duty tax on netting materials remains. There has been no tax reduction on insecticides.

net was used, it was estimated that 63 percent of young children slept under a bed net. None of the bed nets had been treated with insecticide since they had been purchased.

**Box 9. Timeline of Major BDMI Activities for Use of Insecticide-Treated Materials, 1998-2002 (presented as sets of activities and interventions)**

| *Date* | *Activity or Intervention* |
|---|---|
| | ***AMREF and DHMT*** |
| 1998 | Baseline survey of knowledge, attitudes, and practices on ITN use |
| 1998 | Qualitative assessment of potential delivery systems for ITNs |
| 1999 | Survey of community groups, pharmacies, and health facilities for capacity to distribute ITNs |
| 2000 | Intervention to set up ITN distribution outlets<br>• Training of community members<br>• Applying selected criteria to determine outlets<br>• Training of outlet officials<br>• Creation of revolving funds |
| 2000 | Feasibility assessment of approach to distribution outlets |
| 2001 | Scaling up of ITN outlets |
| 2002 | Planned assessment |
| | ***DPHO and AMREF*** |
| 2002 | Intervention to introduce malaria health programs in schools |
| 2002 | Planned assessment |

## Promoting Use of Insecticide-Treated Nets

Box 9 summarizes the activities designed to increase the use of insecticide-treated materials. Research studies undertaken by BDMI in 1998 and 1999 provided additional baseline information, which was used to develop an intervention to increase use of insecticide-treated bed nets. One study provided information on Bungoma residents' knowledge, attitudes, and practices about using ITNs for preventing malaria (Some et al. 1999a). It showed that only 12 percent of households owned nets; of those households, only a third reported using nets consistently in the week before the survey. A BDMI-supported qualitative study found that while owners were aware that the nets prevented mosquito bites, the great majority (93 percent) did not understand that they prevented malaria. Most net owners also did not realize that nets should be treated with insecticide; of those who were aware, less than one-quarter had re-treated their nets. Among households that did not own nets, most people did not know where to buy them. Cost was the most common reason given for not owning a net, although most non-users said they were willing to pay for them (Baume et al. 1998).

Research from BDMI and elsewhere has shown that ITNs' cost is a major obstacle to their increased use. Programs that provide full or subsidized prices for ITNs are needed for those consumers who can afford them, but "consumer behavior suggests that for most households, ITN products are beyond the household economic means, particularly in rural areas." (Guyatt et al. 2001: 23).

Two other studies carried out under BDMI assessed different delivery systems for increasing the availability of ITNs, and looked at the outlets' capacity to procure and distribute treated materials (Some et al. 1999b; and Shiroko et al. 1999). The systems that provided good coverage included community and religious groups, schools, shops, and street vendors; All of those potential systems except schools were willing to handle the nets. Community groups, pharmacies, and health facilities had adequate storage space for materials and reliable security, but most groups had no training in financial management, marketing, and other relevant skills. In other words, there were ample outlets for distribution of ITNs, but some technical assistance was needed.

BDMI's midterm evaluation, in mid-2000, found that the challenges were to increase the availability and affordability of ITNs and to create consumer demand (and, therefore, a willingness to pay for the nets). There were two possible models to follow: One was a community-based distribution model that had been used in other districts of Kenya,[12] and the other was social marketing.[13]

BDMI chose to test the community-based strategy for two reasons: Only $50,000 had been allocated for the purchase of ITNs—too little to pursue a social marketing strategy—and the project intended to use the sale of ITNs as an income-generating activity that would improve the social and economic well-being of women and youth groups. Training in financial management, leadership skills, and so forth was meant to help these groups to make informed decisions about health and economic issues affecting them (Chiguzo et al. 1999). [14]

Given the baseline findings from the initial research studies, the following interventions have been carried out:

- About 300 health workers, teachers, organized community groups, and community leaders attended a two-day training workshop on ITN technology and malaria control.

[12] Five essential aspects of an ITN delivery system are described in Some et al. 1999b, page 69.

[13] In 2000, with support from USAID, Population Services International (PSI) began a social marketing project to increase access to bed nets in the coastal region. In order to expand this initiative to the entire nation and to establish broad acceptance of bed nets in Kenya, DFID is providing $25 million over five years to PSI, and USAID is supporting technical leadership. This is the largest social marketing of bed nets in the world. The project involves establishing kiosks for distribution in rural areas (1,000 kiosks should be in operation by 2003), and provides subsidized nets and insecticide tablets. In March 2001, 39,000 bed nets were sold, and the target for 2002 is 300,000 nets.

[14] There is also a model involving workplace promotion of ITNs. Preliminary findings suggest that most project sites in coastal Kenya had lower rates of malaria morbidity and hospital admissions, and a reduction in overall health costs. However, in some sites in western Kenya, malaria morbidity either increased slightly or did not change, and hospital admissions for malaria increased in some sites (Chiguzo et al. 1999).

- A number of outlets were set up for distribution of ITNs. An initial group of 15 outlets (health facilities, organized community groups, and a church parish) was selected. Selection criteria included five factors:
    - Being registered as a self-help group with the Ministry of Culture and Social Services, and having a bank account with a certain balance;
    - Being involved in other income-generating activities for at least two years;
    - Having a membership of not less than five persons;
    - Having premises with adequate storage space and security; and
    - Being willing to be trained on leadership and business/marketing skills and malaria control activities (Ngugi 2000).

- Officials from the distribution outlets were trained in business and marketing, financial management, and malaria control. Revolving funds were created to "prime the pump" for ongoing distribution and sale of ITNs.

After the initial group of 15 outlets had been selected and given training and supplies, their performance was assessed in late 2000 (Ngugi 2000). Factors helping or hampering sales (such as the cost of products) were documented. Within three months, about 3,000 nets had been sold, and 95 percent of value of the advance supplies had been repaid by outlets. The strategy was deemed feasible.

### Scaling Up of ITN Activities

After the pilot's success, the number of outlets increased to 51; 73 percent of nets (about 12,000 nets) and 75 percent of insecticide tablets (about 13,000 doses) were sold to community members after 18 months. Most nets were purchased by salaried civil servants and teachers. Among households using nets, 75 percent used the nets for children under age 5 and/or their mothers. The ITN coverage rate increased from 12 percent to 20 percent after 18 months, although less than a third of the nets (29 percent) had been treated with insecticide (Ngugi et al. 2001).[15]

While the BDMI-supported outlets were effective in selling ITNs to certain groups of consumers (salaried civil servants and teachers), it is too soon to judge the effect of subsidized distribution on lower-income groups, for whom cost is reported to be a major constraint. An assessment is planned for late 2002.

Various IEC materials, including leaflets, posters, and a video on malaria, were produced to promote the use of insecticide-treated bed nets. The video has been used for training during workshops and at seminars, while the leaflets have been distributed through schools and organized groups, and the posters have been used in health facilities and schools.

[15] AMREF staff credit the increase in coverage to a combination of BDMI efforts and the PSI social marketing program.

During the final phase of BDMI (July 2001 to December 2002), additional activities are being carried out in order to expand the distribution of ITNs to more outlets. The expansion includes training outlets' officials and health workers at selected health facilities that are also serving as outlets. A number of promotional activities are also being carried out, using radio, print media, and special community events. Another part of the expansion is directed at schools, where teachers are being trained and school health clubs are being established.

The multifaceted approach to implementing the ITN strategy may be important to the strategy's effectiveness. The key components are training in business, related skills, and general malaria control; provision of an initial supply of ITNs; and IEC for the community. However, additional evaluation is needed to determine whether these components are indeed critical and whether the strategy can be sustained.[16]

## Lessons Learned: Insecticide Treated Nets

- The criteria used in selecting distribution outlets are key in the distribution effort's success.

- Equipping existing community-based distribution outlets is an effective strategy for increasing ITNs' availability by selling nets and insecticide tablets. Community-based groups provide a readily available distribution system in rural areas, and do not require the large amounts of funding needed to establish social marketing of ITNs.

[16] See also the list of lessons learned (Ngugi et al. 2001).

# 3. MONITORING AND EVALUATION (M&E)

Monitoring and evaluation (M&E) has been an essential part of the BDMI project design, representing the project's fifth objective: "effective collection and use of information for planning, monitoring, and evaluation." While the first four objectives are direct interventions to improve the health and survival of children and women by reducing the burden of malaria, the fifth is a key function of effective management. As such, it is treated here as an indirect intervention that supports the other project objectives.

BDMI's design specified the expected results from the project's work (see Box 3). These results were expected at four levels: the population living in Bungoma (especially children under age 5 and pregnant women), communities and households, health facilities, and the national malaria control program. Each of the project's objectives has a number of indicators to measure the project's implementation, the effectiveness of the interventions (both direct and indirect interventions), and the interventions' impact on illness and death. (See Appendix 3 for BDMI's process, outcome, and impact indicators.)

BDMI conducted assessments of two data collection systems to determine whether the information collected was of sufficient quality to be useful for M&E. The project also benefited from national surveys of households and health facilities. BDMI supported a number of operations research studies that provided baseline information and follow-up assessments of some of the project's interventions.

Two USAID reviews were carried out to assess progress in project implementation and to guide improvements in the project's work (Jones et al. 1999; Olenja 2000).[17] These reviews were conducted in the project's second and third years. The 1999 review found that DHMT staff was dissatisfied with the heavy emphasis on research, which often leads to community frustration at the lack of tangible progress (Jones et al. 1999: 3). There was also "no sense of ownership of the research or the sense that they [DHMT] are full partners in the project" (Jones et al. 1999: 4). There were several reasons for the unhappiness: Much of the data analysis was done outside of Kenya; capacity building of DHMT staff in data management or report writing was not supported; and research findings and recommendations were not disseminated. Attempts to address these problems were constrained not only by limited time for in-country data analysis by Cooperating Agency staff, but also by the limited time available for already busy DHMT staff to engage in this work.

The second review echoed the concern about insufficient dissemination of research results, especially given BDMI's potential to contribute to national-level program planning for both IMCI and Roll Back Malaria (Olenja et al. 2000). High-profile dissemination of BDMI findings could be sponsored by Kenya's MOH and supported by USAID through workshops or special meetings. To date, this has not happened, although some dissemination activities are planned for the project's final 18 months (see below). Other key recommendations related to M&E were as follows: (1) additional research under BDMI should assess the effectiveness

[17] The first was a review of the USAID/Kenya bilateral program, APHIA. The review was conducted in BDMI's second year, rather early in the project's implementation.

of the interventions in terms of the project's objectives; and (2) the IMCI approach should be assessed for its usefulness as an investment strategy for the health sector.[18] Both recommendations will be addressed, to some extent, in the M&E activities planned for the final phase of BDMI.

The project also supported a number of training activities, workshops, and annual planning meetings, in part to improve M&E and encourage the use of information to improve project implementation.

One of the studies assessing the quality of data and its usefulness for BDMI evaluated the district's vital registration system and hospital surveillance data (Manjrekar and Herman 1999). Data quality from these two sources was found to be rather poor. Even so, it might be useful to compare vital registration data from Bungoma with another "control" district that had no intervention, in order to assess the interventions' impact. The second study assessed the district's health information system, and found that the data were not complete or reliable and would not be useful for BDMI (Ndwiga and Kamau 1999).[19]

Two national data collection efforts, the 1998 Kenya Demographic and Health Survey and the 1999 Kenya Service Provision Assessment, provide baseline information for some of the project's indicators.[20] These two surveys provide information at the national, provincial, and district levels (17 districts were oversampled including Bungoma).

## Operations Research

BDMI has supported 24 operations research and evaluation studies from 1998 to 2002. DHMT, AMREF, CDC, and the Quality Assurance Project helped carry out the studies (as did BASICS in the project's first two years). These studies have provided baseline information on each of the project's five objectives. The information was used to develop the implementation strategies and plans for each of the four interventions (Sections 2.1 to 2.4). The results of these studies are presented in Appendix 2.

The dissemination of information from the project's numerous studies has involved many individuals who helped to design and carry out the project's interventions, and has occurred through the annual implementation planning meetings. However, broader dissemination of the research results does not appear to have occurred. For example, none of the research studies was cited in either of the recent WHO working papers on IMCI (Gelband and Stansfield 2001) or on malaria control (Meek et al. 2001). Nor does there seem to be any association between the WHO Multi-Country Evaluation of IMCI and the BDMI project (WHO 2001).

[18] The review suggests several studies on the cost-effectiveness and cost savings from the IMCI approach (Olenja 2000: 48).
[19] At a workshop conducted for BDMI's midterm review, it was stated that level of reporting from health facilities had deteriorated from 90 percent in 1995 to 43 percent in 1999 (Olenja 2000).
[20] Two earlier DHS surveys on Kenya were conducted in 1989 and 1993.

BDMI has supported the following activities for improved data collection for monitoring and planning.

- An assessment of death records for children between 1994 and 2000 for Bungoma and Busia/Teso districts, conducted in 2000 and 2001. Researchers hoped that a comparison of vital statistics from the two districts might permit an assessment of the impact of BDMI interventions. A thorough analysis of the vital registration data revealed that reporting of child deaths appeared to vary during the study period, based on an indirect approach to estimating overall completeness of reporting. The vital registration data were deemed unsuitable for comparing child mortality in the intervention and control districts or for assessing changes in mortality within the districts over time, because there was no way to distinguish changes in reporting from actual changes in deaths. It was further determined that it was simply not possible to determine the interventions' impact on child survival in Bungoma using vital registration data (Roper 2002).

- DHMT developed new data collection forms, which were pretested at some health facilities and in communities. During the project's final months, there are plans to finalize the health management information system forms and to harmonize them with the MOH's health management information system.

- A training curriculum for health workers on health management information systems was developed by BDMI and the MOH. During the project's final months, BDMI will train DHMT and health workers on the health management information system, which presumably will result in improved and more timely reports on health services. The MOH has yet to streamline the more than 10 health forms currently in use (Olenja 2000).

Box 10 summarizes the M&E activities planned for BDMI's final months. Those responsible for implementing the final M&E activities include district health staff (clinical officers, public health nurses, laboratory technologists, health education officers, etc.) and staff from AMREF, CDC, QAP, and USAID.

One of these M&E activities is the 2002 Bungoma District Health Facility Survey. In April 2002, this survey was conducted as part of the final evaluation of BDMI in all health facilities with IMCI-trained health workers. Each of the 30 facilities was visited by a survey team twice in two and a half weeks. People in charge of facilities were informed in advance of the dates of the survey, but not of the dates on which their facilities would be visited. In-charges and health workers were instructed to follow their usual staffing and procedures on the days of the survey. The data are currently being processed.

The analyses of data collected during the health facility survey will include the following: [21]

- The quality of care provided to sick children, according to IMCI indicators defined by WHO/UNICEF;

[21] Elizabeth Herman of CDC provided the information on planned analyses for the 2002 health facility survey, as well as the observations made during the survey.

- Determinants of correct classification and treatment (including pre-service, in-service and on-the job training, as well as supervision, facility supports, case characteristics, and demands of the caregiver);
- Differences between the performance of health workers trained and not trained in IMCI, with respect to the inappropriate use of injections, antibiotics, and antimalarials;
- The cost and effectiveness of the package of interventions (promotional visits, IMCI registers, and facility incentives) in improving health workers' performance;
- The reasons for discrepancies between health workers' and exit examiners' classifications (for example, different histories provided by the caregivers, different assessment findings, or failure to process assessment findings correctly);
- Caregivers' ability to recall messages that were documented to have been delivered during the encounter, and how caregivers' recall was affected by having the health worker verify that the caregiver understood the messages;
- The range and average number of messages prescribed by IMCI for children in the study; and
- A comparison of government and nongovernment facilities with respect to waiting times, percentage of children with severe classifications, percentage of caregivers who request a specific treatment, costs to the caregiver, presenting complaints, and the frequency and extent of unneeded polypharmacy.

Several observations made during the survey are of note.

- Health workers in facilities with community pharmacies were consistently positive about the pharmacies' impact on drug availability. The health facility assessment confirmed that these pharmacies were functional and enhancing the availability of drugs. (The community pharmacies use cost-sharing funds to maintain a stock of essential drugs that are made available to patients, at reasonable cost, when the government supplies are exhausted.)
- In several facilities, health workers without IMCI training were assigned to see sick children, although many other health workers who had received IMCI training were available.
- In some facilities, there had been an effort to provide on-the-job training for health workers who had not yet attended an IMCI course.
- Late starting times, long waiting times, and health workers' failure to report for duty continue to be problems in many facilities.

Conducting another household survey to follow up the 1996 baseline household survey would provide a useful complement to the 2002 health facility survey. A household survey to assess changes in use of ITNs is being planned; such a survey might also assess changes in caretakers' practices in caring for sick children, allowing researchers to determine whether such changes could be attributed to BDMI interventions. The one caveat for conducting a household survey in the final year of the project is that some of the interventions to be assessed may not have been going on long enough to cause changes in key behaviors.

## Box 10. Planned Monitoring and Evaluation Activities

*Case Management at Health Facilities*

1. Survey of health facilities to evaluate health workers' performance in classifying severe illness and appropriate use of drugs.
2. Assessment of health workers' performance on diagnosis and lab microscopy.
3. Periodic supervisory visits: quarterly visits by IMCI supervisors and semi-annual visits by DHMT supervisors.

*Case Management at Home/Community*

1. Review of pilot sites' implementation of key practices for community IMCI.
2. Monitoring of drug vendors' performance.
3. A second evaluation of retail outlets' compliance with malaria guidelines.
4. Evaluation of the impact of neighbor-to-neighbor education on malaria treatment knowledge in villages.

*Management of Malaria in Pregnancy*

1. Assessment of SP intermittent presumptive treatment and insecticide-treated bednets (ITNs) coverage during pregnancy.
2. Assessment of placental parasitemia at sentinel sites to evaluate interventions' impact.

*Use of Insecticide-Treated Materials*

1. Sentinel surveys at selected ITN outlets.
2. Household survey on ITN use.
3. Monitoring ITN outlets' performance.

*Collection and Use of Information*

1. Updated Bungoma District health profile.
2. Preparation and dissemination of report on research findings from BDMI research and evaluation and lessons learned.
3. Review of implementation plan performance.
4. Impact assessment and end of project evaluation.

### *Lessons Learned: M&E*

- The involvement of local counterparts from the district, provincial, and national levels in the development of an M&E plan, as well as the collection and use of M&E data, ensures that useful information will be collected and actually used to improve the project and to apply the findings more broadly within the country. Involving local counterparts also leads to improved skills and to greater local capacity to carry out M&E.

- The iterative and research-based model, which was an integral part of BDMI, is an effective approach to applying baseline information in order to develop and modify interventions.

- Obtaining relevant baseline information for project indicators can be very time-consuming in the early phase of the project, but such information is essential for assessing the project's implementation and achievements.

- The collection of vital registration data demonstrates some potential for the data's use in efforts to monitor programs. Seasonal patterns in mortality and similarity in districts' year-to-year variations suggest that the data reflected reality to some degree. However, further analysis has shown that there is no way to be sure about the completeness of reporting or, more importantly, whether completeness of reporting varies over time. Until these issues are resolved, vital registration data are not useful for monitoring programs.

- Governments and donors need to reconsider the value of efforts to assess the overall impact of interventions on morbidity and mortality. Careful assessment of two sources of data (vital registration and hospital surveillance data of child deaths) revealed that the data are not of sufficient quality to be useful for assessing impact.

- Involving the national Health Management Information System officials in the design and pretesting of new health information forms is crucial for preventing parallel systems of reporting. However, such involvement can be a slow process, due to government bureaucracy, and can hamper timely implementation of project innovations.

- The process of using and disseminating research findings from a pilot project, such as BDMI, necessarily involves those individuals responsible for the design and implementation of interventions. However, the process must also reach beyond the principal actors on the project to broader audiences, including national health officials and international organizations and donors concerned with the particular health issues that the project is addressing. Such outreach should be built into the initial phase of project implementation, and should continue throughout the project's life.

# 4. MANAGEMENT, COORDINATION, COOPERATING AGENCIES, AND OTHER KEY ISSUES

This section addresses several topics for which there are no obvious lessons learned available, but that may provoke key personnel to consider possible lessons during BDMI's final year.

## 4.1 Management and Coordination

The main institutional partners in the implementation of BDMI have been the MOH, DHMT in Bungoma, and AMREF. USAID-supported cooperating agencies (CAs), including CDC, QAP, and BASICS (in the first two years of BDMI), have played an important role in the implementation of project interventions.

The management innovation in BDMI was having a local NGO, AMREF, be responsible for coordination and, to a lesser extent, implementation. The decision to put AMREF in charge of coordination and implementation was made in part because the MOH was not interested in coordinating the pilot project. Several key features have contributed to making coordination of project activities more effective. Annual implementation planning meetings have involved all key institutional partners, including USAID/Kenya and USAID/Washington. Quarterly steering committee meetings, involving the MOH staff in Nairobi, DHMT, AMREF and USAID, have been held in different venues, adding to each institutional partner's involvement. An AMREF staff member, who has served as project director, works in the DHMT building in Bungoma, where facilities and resources can be shared. Project staff feels that this on-site collaboration has been very beneficial for project implementation. Finally, DHMT assigned a health officer to BDMI; the officer has served as a liaison for coordinating DHMT's work with AMREF and the CAs.

## 4.2 Role of Cooperating Agencies

The project design included using technical expertise and assistance from USAID cooperating agencies. Although such expertise can be very useful, there are legitimate questions about the sustainability of its use. Because DMHT was an implementing partner for much of the work, efforts in a number of areas may be sustainable

### Advantages

- CAs bring technical expertise and experiences from work in other settings.
- CA staff contributes to the overall level of effort devoted to implementing various tasks. For example, supervisors and DHMT did not have time to analyze information on supervisory forms, and so CDC staff was called on to analyze the data.
- CAs serve as motivators for local staff to keep implementation activities on schedule.
- CAs tend to push for the application of findings from research that they have helped to implement, so their involvement serves to remind local staff, who are charged with everyday implementation, of the importance of data-driven programs.

### Problems

- CA staffs are not always available when it best suits project implementation. Furthermore, different CAs sometimes competed for the same time for their technical assistance visits.
- Communication among various groups involved in BDMI (CAs and AMREF) was sometimes problematic, especially in terms of having reports available to all groups. E-mail has helped, but a website with relevant reports, instruments, and documents would have been useful. The annual planning meetings were a useful forum for updating the project partners.

## 4.3 Sustainability

Under BDMI, sustainability is defined in terms of the capacity of the district MOH staff, principally DHMT, to continue the activities once the project has ended, so strengthening DHMT's capacity has been a priority. For example, AMREF conducted a number of short-term management courses, providing training to a number of DHMT members. However, because some of the trained staff has been redeployed out of the district, there is an on-going need for management training. Training continues to be supported in IMCI and health information systems. This training is also important because the MOH is decentralizing (see Appendix 4 for a summary of training activities supported by BDMI).

MOH staff, especially DHMT, have been involved in various research studies supported by BDMI and implemented by AMREF. BDMI research implemented by CDC and the Quality Assurance Project has also involved DHMT, but to a more limited extent, largely because some aspects of research, such as data analysis and report writing, are more difficult when CAs are not based in Kenya.

Improving supervision of district health workers has been a priority for BDMI. There is some concern about the sustainability of such supervision, in part because the resources needed (both transportation costs and travel allowances) had been covered by the project. Although the MOH headquarters have not allocated additional funds for supervision, DHMT has spent part of the 25 percent cost-sharing funds for supervision. The cost-sharing funds are not adequate for BDMI supervision, however, so the intensity and frequency of supervisory visits probably will not be sustainable after BDMI ends (see Section 2.1 for more discussion of supervision).

## 4.4 Links to National Health and Malaria Policies and Programmes and Other GOK Programmes

When the BDMI project agreement was designed and approved by GOK and USAID/Kenya, the MOH had not yet fully incorporated IMCI into its policy guidelines for improving child health and survival. In principle, the IMCI approach is now part of national health policy, and the national adaptation process of IMCI has been completed: The generic WHO/UNICEF training materials were reviewed and adapted to Kenya's needs.

As BDMI has been planned and carried out, there have been various links between the project and national health programmes (Olenja et al. 2000). At the district level, DHMT has used the project's integrated approach to help combine previously separate, often parallel health programmes. Many health providers now examine children in a comprehensive way, rather than following the narrower approach of treating only one disease. The district's health outreach activities now include checking the child's current health status (including anaemia), not just the child's immunization and nutrition status. Furthermore, a DHMT member who had worked with the IMCI National Adaptation Task Force helped to modify BDMI's generic training materials so that they would adhere to the national guidelines. Bungoma DHMT members, trained as facilitators by BDMI staff, were also involved in IMCI training in other districts. The Bungoma District IMCI project manager and focal point are also members of the National IMCI working group.

MOH personnel have also participated in BDMI implementation in various ways, including training, provision of malaria guidelines for training, and project meetings. For example, MOH headquarters staff has attended all annual planning meetings, quarterly steering committee meetings, and BDMI workshops, and have also accompanied the BDMI team on educational visits to Uganda and Tanzania. MOH staff from the Western Province and Bungoma District have also attended BDMI meetings. In addition, a representative from the National Malaria Control Programme has attended the BDMI quarterly meetings.

BDMI staff has also pursued associations or links with other MOH programmes dedicated to child survival (such as the divisions of child health, environmental health, reproductive health, health education, clinical medicine, and HMIS). These links have fostered good institutional rapport and consideration of relevant policy issues.

The following examples also show how links between BDMI and other levels of the health care system or other parts of government have affected health care.

- GOK drug supply policy. As members of the National Malaria Coordinating Committee, USAID and AMREF had successfully advocated changing the government's drug supply policy on sulfadoxine-pyrimethamine (SP), MOH's first-line antimalarial treatment. The original policy had required a license costing 1000 shillings, making the drug prohibitively expensive for small businesses. The law was changed in 2000, and SP is now sold over the counter. This legal change was critical to the success of BDMI's training program for drug vendors and community-owned resource persons to provide SP.

- Improved drug labeling. BDMI successfully persuaded the manufacturer of Malaratab, the most popular brand of amodiaquine, to correct the dosage information that appears on the drug's label.

- Multiplier effect of BDMI training. To a limited extent, the various BDMI training programs have helped improve knowledge and skills about IMCI and ITNs among health workers in other districts.

- Links between MOH and BDMI in terms of expanded training, in-service supervision, and referrals. BDMI's activities are an integral part of DHMT activities, because the project is implemented by the MOH through the DMHT, with technical assistance from USAID-supported cooperating agencies.

- Multi-sectoral collaboration A district Community Integrated Management of Childhood Illness committee has been established to coordinate and monitor various partners' activities related to BDMI's CIMCI intervention. However, multi-sectoral collaboration between ministries, such as the MOE and MOH, is difficult because of ministries' different operational and budgeting plans and procedures.

BDMI is part of a regional USAID-supported project, the African Integrated Malaria Initiative, which is also supporting pilot projects in Benin, Malawi, and Zambia. During the final phase of BDMI, exchange visits for MOH and AMFREF staff are planned, so that staff can learn first-hand about the experiences in the three other countries and share BDMI's experiences and lessons with officials in those countries.[22] In addition, USAID staff in Washington has expressed interest in supporting a conference on effective operational strategies for malaria control, drawing on this regional effort, as well as on the work of the World Health Organization, other donors, and other Africa countries.

[22] In Malawi, for example, the Blantyre Integrated Malaria Initiative (1998-2002) has prepared a preliminary set of lessons learned and best practices that presumably will be presented at the planned international meeting (Blantyre Integrated Malaria Initiative 2002).

# 5. CONCLUSIONS

The BDMI pilot project represents a creative pulling together of program strategies, local initiatives, and outside expertise. Two integrated strategies are being tested: one to improve the care of sick children, and one to reduce the burden of malaria, especially on children and pregnant women. The project has already provided useful baseline information on knowledge, attitudes, and practices in Bungoma; the data have informed the project's design and implementation, and will also be useful for evaluating the interventions.

Multiple evaluations of IMCI case management have shown that quality of care can be improved with a reasonable level of support. Two other interventions under BDMI—the outreach "vendor-to-vendor" education strategy and the distribution outlets for insecticide-treated bed nets through community-based groups—have shown sufficient promise that they are being expanded.

Good documentation of BDMI's operational model will be key to expanding or scaling up the interventions in other districts and provinces in Kenya. This report provides preliminary documentation into BDMI's fifth year. Since BDMI is an ongoing pilot project, many activities continue to be implemented, including those to assess the outcomes and effectiveness of the interventions and support activities. There will be more evidence about these interventions available once the M&E activities planned for the final phase of the project are carried out. The impact assessment and end-of-project evaluation that USAID is planning to conduct should also contribute to more definitive documentation of the operational model.

One recommendation from the midterm review was to conduct a retrospective analysis of the start-up and recurrent costs involved in carrying out the project (Olenja 2000). To date, there has been no retrospective cost analysis; unfortunately, at this point it might be difficult to provide good cost estimates, however desirable that might be.

In 2000, WHO's Roll Back Malaria and IMCI Task Forces held a joint meeting in Harare and recommended steps for scaling up the two approaches. Subsequently, a framework was developed to scale up RBM and IMCI implementation in African countries (WHO/AFRO 2001). Many of the experiences and lessons learned from BDMI's efforts in both malaria control and IMCI tie into the proposed framework and would serve as a practical guide for scaling up implementation.

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# Appendix 1. List of Lessons Learned from BDMI

**Case Management in Health Facilities**

- Combining IMCI case management training with a reasonable level of supervision, support, and follow-up can improve IMCI implementation.

- Measures of quality of care that are documented through supervision data and health facility surveys probably represent the upper limits of performance. Health workers acknowledge that they do not follow IMCI guidelines with every sick child, and many acknowledge that their performance is different when they are not being observed.

- It may not be possible to improve IMCI's implementation beyond a certain point until there is a significant change in the expectation for, monitoring of, and feedback regarding quality of care, or until there is a link between performance and salary or benefits.

- Implementing problemsolving teams at health facilities appears to be an effective strategy for improved IMCI classification and counseling**.**

- IMCI trainers and supervisors consider on-site clinical supervision an important part of improving implementation.

- Hospital policies, such as those prohibiting nurses from writing outpatient prescriptions or requiring that patients go to a central pharmacy, can thwart improvements in implementing IMCI.

**Case Management at Home and in the Community**

- One lesson *reconfirmed* through BDMI is that case management of sick children at home and in the community must be an integral part of any strategy aimed at improving child health and survival, because most children are treated at home, and many never are taken to a health facility.

- Training, motivating, and equipping mobile vendors and attendants at wholesale drug counters to communicate malaria guidelines to retailers appears to be an effective way to spread the message to small, dispersed outlets at a reasonable cost.

- Jobs aids (posters) that address the concerns and issues facing small retailers in complying with national malaria guidelines, written in a language that retailers can understand, seem to have significantly improved their compliance with the guidelines.

**Management of Malaria During Pregnancy**

- Implementing intermittent preventive treatments requires an integrated, multilevel approach; it is not enough to simply train health workers. The issues of drug supply, systems support, and community buy-in must be addressed simultaneously.

- Implementing an intervention such as intermittent preventive treatment should be an iterative process, in which anticipated problems are addressed through pilot interventions, the results are assessed, and new trial solutions are devised and tested.

**Use of Insecticide-Treated Materials**

- The criteria used in selecting distribution outlets are key in the distribution effort's success. (The five criteria are listed in Section 2.4 of the report, p. 44.)

- Equipping existing community-based distribution outlets is an effective strategy for increasing ITNs' availability by selling nets and insecticide tablets. Community-based groups provide a readily available distribution system in rural areas, and do not require the large amounts of funding needed to establish social marketing of ITNs.

**Monitoring and Evaluation**

- Involvement of local counterparts from the district, province, and national levels in the development of an M&E plan, as well as the collection and use of M&E data, ensures that useful information will be collected and actually used to improve the project and to apply the findings more broadly within the country. Involving local counterparts also leads to improved skills and to greater local capacity to carry out M&E.

- The iterative and research-based model, which was an integral part of BDMI, is an effective approach to applying baseline information in order to develop and modify interventions.

- Obtaining relevant baseline information for project indicators can be very time-consuming in the early phase of the project, but such information is essential for assessing the project's implementation and achievements.

- The collection of vital registration data demonstrates some potential for the data's use in efforts to monitor programs. Seasonal patterns in mortality and similarity in districts' year-to-year variations suggest that the data reflected reality to some degree. However, further analysis has shown that there is no way to be sure about the completeness of reporting or, more importantly, whether completeness of reporting varies over time. Until these issues are resolved, vital registration data are not useful for monitoring programs.

- Governments and donors need to reconsider the value of efforts to assess the overall impact of interventions on morbidity and mortality. Careful assessment of two sources of data (vital registration and hospital surveillance data of child deaths) revealed that the data are not of sufficient quality to be useful for assessing impact.

- Involving the national Health Management Information System officials in the design of new health information forms is crucial for preventing parallel systems of reporting.

However, such involvement can be a slow process, due to government bureaucracy, and can hamper timely implementation of project innovations.

- The process of using and disseminating research findings from a pilot project, such as BDMI, necessarily involves those individuals responsible for the design and implementation of interventions. However, the process must also reach beyond the principal actors on the project to broader audiences, including national health officials and international organizations and donors concerned with the particular health issues that the project is addressing. Such outreach should be built into the initial phase of project implementation and should continue throughout the project's life.

**Role of Cooperating Agencies**

- CAs bring technical expertise and experiences from work in other settings.
- CA staff contributes to the overall level of effort devoted to implementing various tasks. For example, supervisors and DHMT did not have time to analyze information on supervisory forms, and so CDC staff was called on to analyze the data.
- CAs serve as motivators for local staff to keep implementation activities on schedule.
- CAs tend to push for the application of findings from research that they have helped to implement, so their involvement serves to remind local staff, who are charged with everyday implementation, of the importance of data-driven programs.
- CA staffs are not always available when it best suits project implementation. Furthermore, different CAs sometimes compete for local staff's time when planning and carrying out their technical assistance visits.
- Communication among various groups involved in BDMI (CAs and AMREF) was sometimes problematic, especially in terms of having reports available to all groups. E-mail has helped, but a website with relevant reports, instruments, and documents would have been useful. The annual planning meetings were a useful forum for updating the project partners.

Appendix 2. Summary of Research and Evaluation Studies conducted under BDMI by Project Component, 1998-2002

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| **CASE MANAGEMENT IN HEALTH FACILITIES** | | | | |
| **Integrated Management of Childhood Illness** | | | | |
| **Recognition, diagnosis, and treatment** | | | | |
| 1999 | Barat and Kramer, 1999 | Assessment of microscopic diagnosis of malaria in 8 district HFs | CDC | • Accuracy of blood slide diagnosis of malaria: sensitivity was adequate (85%); specificity was low (63%).<br>• 2/3 of children with fever had blood slide analysis although IMCI guidelines do not call for microscopy.<br>• Anitmalarial drugs were prescribed very frequently and often inappropriately (e.g., 38% of patients w/o fever and 65% of those with a negative blood slide result were prescribed antimalarial treatment) |
| 2000 | Gikunda, Some, and Loolpapit, 2000 | Randomized, non-blinded clinical trial in three district HFs of sensitivity of malaria parasite (PF) to drug treatment | AMREF | • Adequate clinical response rates of 77.6% and 95.4% to Phyrimethamine-Sulfadoxine (SP) and Amodiaquine (AQ), respectively. SP is first-line treatment of MOH. Parasitological resistance to SP was high (32.6%) in one HF. |

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| **Training of health workers** | | | | |
| 1998 | Lin and Tavrow, 2000 | Case study of HWs in 38 HFs in Bungoma and Vihiga Districts conducted by IMCI trainers and supervisors | QA Project, AMREF, and DHMT | There were serious deficiencies with HW performance of IMCI guidelines:<br>• HWs did not check for all danger signs for illnesses in over 33% of children observed or for all major symptoms in 66% of children.<br>• Fewer than 10% of children had a complete assessment.<br>• Less than 20% of children were correctly classified (with severe, moderate or mild illness).[23]<br>• Only 60% of sick children received correct treatment.<br>• HWs expressed high frustration performing IMCI finding it too complex and time consuming.<br>• More than 80% of HWs reported that drugs and supplies were often not available. |
| 1999 | Herman, 1999 | Baseline study (prior to IMCI training or supervision) to assess QOC of sick children visiting 15 non-government HFs | CDC & AMREF | • HW performance was quite varied (e.g., of 153 observed encounters, 70% involved asking about fever and only 20% about immunization history). 14% of severe, 43% of moderate, and 34% of mild cases were identified correctly using IMCI classification.<br>• HW performance in referral and prescribing acceptable medication was: 45% of severe cases were referred and 30% received acceptable medication. 46-56% of moderate cases, but only 33% of mild cases were treated appropriately |

[23] It should be noted that this finding differs from other post-training evaluations, which found a higher percent of children correctly classified (Odhacha et al., 1998 and Herman, 2001).

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|---|---|---|---|---|
| | | | | (antibiotics were often given for simple cough or cold).[24]<br>• Malaria treatment practices revealed some problems, e.g., 35% of 120 diagnosed malaria cases were given two or more antimalarials; 39 percent of children without any history or signs of fever were treated with an antimalarial.<br>• Pharmacy supplies: all HFs had SP and drugs for treating pneumonia; supplies were deficient in ORS and vit. A. Other medications to implement IMCI were available in most HFs. |
| 1999 | Smith et al., 1999 | Assessment of completion of referrals based on IMCI guidelines (non-random sample of children referred for severe illness) | CDC | • Of 157 cases, almost 70% had completed referrals, and 30% of children were not taken at any referral facility.<br>• Most children in study who had been recommended for referral had at least one IMCI illness classification, and hence over-referral was not a problem.<br>• Caretakers' reasons for not completing referral were very limited with about half citing "no money."<br>• 70% of cases completing referral were "well" at the time of interview compared to 21% of cases not completing referral. |
| 2000 | Herman, 2000 | Among 32 IMCI-trained HWs at 14 gov't HFs, assessment of their perceptions and knowledge in treating severely ill children | CDC | • Reported use of IMCI guidelines ranged from 20% to 100% of sick children.<br>• HWs' recall of criteria for classifying *severe* illnesses varied; e.g., 56% recall for *severe* malnutrition and/or anemia, and 13% for severe dehydration. |

[24] Non-government HW performance was similar to GOK HWs in a 1994, pre-training survey (CDC and Kenya-Finland Primary Health Care Programme, and Kenya Ministry of Health, 1994).

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|---|---|---|---|---|
| | | | | • HWs' reasons for classification and treatment problems with *severe* illness were many and included factors related to the HW, to the facility support, and to client attitudes.<br>• Most HWs' reported use treatment guidelines, but less than 50% use the guidelines for assessment, classification, and counseling.<br>• HWs' recall of appropriate treatment ranged from 100% for severe pneumonia and for dehydration to 41% for severe malnutrition and/or anemia.<br>• 50% of HWs reported problems using the guidelines. Most common problems were lack of IMCI drugs and time to follow the guidelines.<br>• HWs' most common reason for failing to refer severely ill children was that caregivers' refused or were unable to take the child to another HF.<br>• In-charges supported central supervision (HWs' travel for 2-3 days a year to a district hospital) for clinical supervision. |
| 2000 | Tavrow, Malianga, and Kariuki, 2000 and Tavrow et al., 2001 | Follow-up of HWs' performance to assess impact of systematic team problem solving | QA Project and ?? | • HFs with problem-solving teams showed a significant improvement in IMCI case management compared to HFs without teams. Teams with high problem-solving ability performed much better on assessment and counseling, but not on treatment and classification.[25]<br>• An estimate of cost for setting up, supervising and, coaching problem-solving teams is about $425 per facility, which compares with the cost of training a provider in IMCI of $250-450. |

[25] During the assessment, each problem-solving team completed a case study exercise; those teams with a 60% score on the exercise and who had implemented at least two solutions were determined to be "higher-ability" teams.

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| **Supervision** | | | | |
| 1998 | Ong'ayo, Makama, Kamau, and Kariuki, 1998 | Assessment of *non-technical barrier*s to supervision at four levels of health care system (province, district, HF, and community) | DHMT and AMREF | • Provincial-level constraints: lack of transport, poor information flow, and inadequate funding for field-based activities.<br>• District-level constraints: lack of workplans, targets, supervisory guidelines and schedules for visiting rural HFs; inadequate transport, funding, stationery, and office space; negative interpersonal relationships among HWs, inadequate IEC;<br>• HFs constraints: shortage of qualified staff, poor staff attitudes, negative client/community attitudes, and inadequate funding.<br>• Constraints to IMCI implementation: limited support from HF in-charges, inadequate staff trained in IMCI, inadequate essential equipment and drugs.<br>• Community-level constraints: , absence of incentives for CORPs and lack of transport for HWs. |
| 2001 | Becknell 2001 | Assessment of HW use of clinics registers in 15 intervention health facilities | CDC | Two months after introduction of registers:<br>• HW in some facilities used registers consistently and found them helpful as job aids.<br>• HWs in other facilities that suffered from chronic management problems or were not following IMCI guidelines routinely did not use registers consistently.<br>• HW performance in classifying and treating children with severe illness was good particularly among HW who had received IMCI training, IMCI refresher training, and training in use of the register. |

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
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| **CASE MANAGEMENT AT HOME/COMMUNITY** | | | | |
| 1996 | Hamel et al., 2001 [26] | Household survey of home treatment of children with fever, bednet use, and attendance at antenatal clinics | CDC | • Of febrile children under 5 years of age, 43% received care at a health facility, 47% received an antimalarial drug at home, and 25% received neither.<br>• Of antimalarial treatments given at home, 91% were started by the second day of fever and 92% were with chloroquine, often the incorrect dosage.<br>• 5% of children under 5 years of age slept under a bednet. No net had been treated with an insecticide since purchase.<br>• 91% of pregnant women had made at least two antenatal visits. |
| 1998 | Baume et al., 1998 | Qualitative study with female caretakers with children under 5 (97 illness narratives) in catchment area of 8 HFs | BASICS and DHMT | • Childhood febrile illness is almost always treated first at home by giving some combination of drugs (see below). Caretakers do not recognize symptoms of severe illness (twitching or convulsions).<br>• Most caretakers seek medications from pharmacies, which are often more conveniently located than HFs. Drugs are used extensively, and caretakers "know" what drugs to give, or they consult pharmacy staff, who are often not trained.<br>• Typically drugs are given in combination (antipyretic, antimalarial, and antibiotic). Most drugs are administered incorrectly. About half of children with a fever are taken to a HF, usually 1- |

[26] Although the field work for study was conducted in 1996, prior to the official start of the project, it served as the baseline survey for BDMI.

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| | | | | 3 days after onset of fever and after home treatment fails. The HF may be MOH, religious-based, or a private commercial clinic.<br>• Many caretakers prefer private providers, and most obtain medicines from local shops, chemists, and pharmacies. Half of cases taken to a HF go to a private clinic, which are often more conveniently located, have shorter wait times, friendlier staff, and more flexible payment plans. Staff at private clinics is not always qualified, and there appears to be little regulation of private clinics' services.<br>• In many HFs, mothers do not receive adequate counseling about proper use of prescribed drugs.<br>• CQ is the most common antimalarial used. Fansidar, first-line drug for malaria, is becoming known and accepted by HWs and caretakers.<br>• Many caretakers display "nomadic care seeking" behavior, going to different providers and shops resulting in both over and under dosage of medicines and duplication.<br>• While most caretakers know of bednets, less than 10% of households use them.<br>• The vast majority (86%) of pregnant women had 3 or more visits to ANC clinics.<br>• |
| 1998 | District Health Management | Baseline study of potential drug outlets in 6 | DHMT, Bungoma | • Drug vendors are the main drug outlets in rural areas; pharmacies are an important source in |

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| | Team, Bungoma, MOH, 1998 | administrative divisions in Bungoma District[27] | | urban areas.<br>• Drug distributors are very knowledgeable about types of antimalarial and antipyretic (fever) drugs. However, staff of most outlets has inadequate knowledge of drug dosages.<br>• Non-compliance with antimalaria treatment regimen is perceived by staff of private clinics and pharmacies as a major problem for their patients/clients.<br>• SP is perceived as effective but expensive.<br>• Training and supervision on appropriate drug usage/administration are viewed as necessary or desirable. |
| 2000 | Tavrow, Shabahang, and Makama, 2002 | Evaluation using mystery shoppers of "vendor-to-vendor" outreach education strategy with private drug outlets[28] | QA Project, DHMT and AMREF | • More than 70 different brands of antimalarials were stocked in the outlets. AQ is the most-stocked type (81% of outlets). SP, the MOH's first-line drug, is stocked by 39% of outlets.<br>• Most (50%) shoppers purchased AQ, and 23% purchased SP.<br>• 66% of outlets that had received job aids had them displayed in a visible location.<br>• Outlets receiving job aids had significantly better malaria knowledge and prescribing practices than outlets that did not receive job aids. 63% of shoppers who purchased SP at intervention outlets were told the correct dosage. Only 17% of shoppers who purchased SP *and* an antipyretic (following MOH guidelines) were told the correct |

[27]MOH HFs were not sampled because a 1996 Bungoma household survey found that only 9 percent of antimalarial drugs were obtained from government facilities (Hamel et a., 2001). Potential drug outlets included: women's groups, private clinics and pharmacies, drug venders (static and mobile), youth groups, men's groups, boarding schools, community pharmacies, traditional healers/herbalists, and Community Owned Resource Persons (CORPs).

[28]Three are about 1,500 private drug outlets in Bungoma District (**JRS**: move to main text), and they include retail shops, kiosks, retail pharmacies, and private clinics. In the study, 63 invention outlets were visited and 38 control outlets.

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| | | | | dosage compared with fewer than 2% of shoppers at control outlets.<br>• $17/outlet is the estimated cost of the intervention. |
| 2001 | Ngugi et al, 2001 | Baseline survey of households to assess current practices related to child health and survival and maternal health | AMREF | • 50% children had fever in last 1-2 weeks: 50% of mothers gave child panadol, 8% gave chloroquine, and 12 % gave nothing.<br>• After trying home remedies, 63% of caretakers took children for treatment, mostly to gov't HFs, and 37% did not seek outside care.<br>• Of those seeking care, 47% sought treatment within recommended 1-24 hours, other 53% sought treatment more than 24 hours after onset of fever.<br>• Of those seeking care from HFs for fever and convulsion, 69% went to gov't or NGO HFs, 13% went to private HFs.<br>• 97% of mothers attended ANC clinics during their last pregnancy.<br>• 68% of deliveries are conducted at home.<br>• Only 16% of mothers took recommended two doses of SP IPT, and only 18% slept under a mosquito net during last pregnancy.<br>• Mosquito net coverage was 20% with 52% of households having only one net. 64% of nets were bought within district. 29% of nets had been treated with insecticide. 8% of children under 5 slept under a net the previous night.<br>• 83% of caretakers were satisfied with services offered at nearest HF because they got good treatment/advice on drugs and quick services. |

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| **MANAGEMENT OF MALARIA IN PREGNANCY** | | | | |
| 1998 | Williams and Mungai, 1999 | Baseline study of HFs and ANC services to assess extent and impact of malaria during pregnancy and ANC services; qualitative study of women, TBAs, and lay midwives, HWs, et. | CDC and DHMT and staff | • Lower than expected prevalence of malaria was found because the survey was conducted when transmission was lower (rains came late that year); the study was repeated when transmission was higher, see next entry).<br>• Both anemia and low birth weight were problems, with highest rates among primigravidae<br>• HWs had little understanding of malaria prevention and how prophylaxis differed from treatment, and HWs were generally not aware of the new IPT policy.[29] Only 4% of pregnant women were using malaria prophylaxis.<br>• Microscopic diagnosis showed low specificity and high negative predictive value of blood smear results suggesting that women with malaria would not go untreated.<br>• The quality of ANC services is variable: e.g., 37% of women studied were anemic, and less than 33% received iron or folate; less than 33% of women attending ANC clinics reported receiving health education, and HWs had little time to spent on teaching given the volume of patients.[30]<br>• Barriers to quality antenatal care from clients' perspectives were HWs' poor attitudes, long |

[29] The MOH had not yet conducted seminars or workshops for HWs to inform them of the new policy on intermittent preventive treatment (IPT).
[30] Bungoma District had recently changed its antenatal education program from providing public education (i.e. open classes) to focusing on the educational needs of each client.

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| | | | | waits, and transportation costs.<br>• Barriers to quality care identified by HWs were lack of reliable communication and transport for patient management/referral, and shortage of supplies.<br>• TBAs were seen as having an important role in pre-natal care, but lacked community and facility support.<br>• Most women began prenatal care in 2nd trimester, either with TBAs or at HFs, and as such IPT should be feasible.<br>• 16% of pregnant women reported using bednets. |
| 2000 | Mungai and Parise, 2000 | Second baseline study as above during high malaria transmission season | CDC and DHMT | • High prevalence of malaria was found with parasitemia rates of 26% and 18% for peripheral and placental respectively. Rates were significantly higher among primigravidae (35% and 28%). With higher malaria rates, anemia was also more prevalent (54% compared to 37% in low transmission season; 63% for primigravidae) suggesting that malaria is an important risk factor for anemia in this season. |
| ? | MABS Population, Health and Development Consultants, 2001 | Assessment of TBA services and practical skills in prenatal care (106 TBAs; skills of 40 TBAs) | MABS PHD Consultants, DHMT, and MOH | • In Bungoma, TBAs are seen as integral to health system, but there is no formal support of their work or referral system between TBAs and other health providers.<br>• TBAs considered themselves attendants-in-labor.<br>• TBAs lack skills to monitor pregnancy and to follow safety procedures during labor. Training improves their knowledge, but lack of follow-up and refresher courses limits retention and use of training. There are no easy clinical guidelines for TBAs.<br>• TBAs carry out unsafe and risky practices, and |

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| | | | | some fail to refer patients with complications due to ignorance, ego and greed.<br>• Policy tension in role of TBAs in ANC and PNC. Most pregnant women visit formal antenatal clinic at HF during pregnancy, yet most deliver at home. Role of TBA in antenatal care is not clear.<br>• Cost (transport and maternity) is main reason that mothers deliver at home; but also attitude of HF staff may be barrier, esp. for women who have not attended ANC in MOH facility. |

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| **USE OF INSECTICIDE-TREATED MATERIALS** | | | | |
| 1998 | Some, 1999 | Baseline household survey of KAP on ITNs for preventing malaria | AMREF and DHMT | • Malaria incidence: 26% of school children has missed at least one day of school due to malaria and overall incidence among households was 32%, both in past 2 weeks. 12% of households had at least one hospital admission due to malaria in past 4 weeks.<br>• Malaria mortality: 9% of households had experienced at least one death of child under 5 in past year.<br>• 12% of households owned at least one mosquito net, and most of these were purchases at shops and supermarkets at an avg. cost of US$6.0. Of household with nets, 55% reported having used them previous night, and only 32% used them every night in past week.<br>• While net owners knew use prevented mosquito bites, only 7% knew they prevented malaria.<br>• 25% of net owners knew about treating nets with insecticide. Of those aware of retreat, only 21% had retreated nets.<br>• Of households without nets, only 14% knew where to buy them. Cost was the most common reason for not owning a net, although most non-users said they were willing to pay<br>• Over 80% of households had members at least of mosquito bites in the evenings. |

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| 1998 | Some, 1999 | Qualitative assessment of potential delivery systems for ITNs[31] | AMREF and DHMT | • Potential delivery systems with good coverage were community and religious groups, schools, shops, and hawkers. Those with low coverage were HFs including PHC and employers.<br>• Reasons for the lack of potential ITN delivery systems: leaders' support, costs, distance, and road network.<br>• Some delivery systems had handled untreated nets, and all except schools were willing to handle ITNs.<br>• Preferred sources of ITNs were HFs, community and religious groups.<br>• Suggested approaches to promoting, distributing, and selling ITNs were public meetings, displays and demonstrations, and house-to-house work. |
| 1999 | Shiroko et al., 1999 | Survey of community groups, pharmacies and HFs on their capacity to procure and distribute ITNs | AMREF and DHMT | • All groups were financially stable and expressed willingness to invest in ITMs program using various financing schemes.<br>• Most members of groups had not been trained in pertinent leadership skills, financial mgt., interpersonal skills, ITMs and insecticide handling, and marketing.<br>• All groups have adequate storage space for materials and reliable security and most preferred ready-made nets<br>• Most groups did not know sources for bulk purchase of ITMs and insecticides. |

[31] Potential delivery systems included: HFs, community-based HFs, shops, hawkers, schools, large employers, and community (youth and women) and religious groups.

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| 2000 | Ngugi, **(no date)**[32] | Assessment of revolving fund for 10 of 15 ITNs distribution outlets and interviews with 124 head of households | AMREF | • Revolving fund is feasible given that 95% of "pump priming" funds were repaid within 3 months of delivery of supplies.<br>• 73% of supplied nets and 75% of insecticide tablets were sold to community members in 3-month period.<br>• Reasons for good sales: use of sales agents who received a commission, high quality nets of different sizes and colors, high mosquito density and prevalence of malaria, and easy access to products.<br>• Factors hindering sales: high cost of products, availability of cheaper, poorer quality nets, and political interference by councilors (? P. 6).<br>• Of households using ITNs, 75 % were used by children under 5 and/or mothers.<br>• 67% of nets were washed at least once within 6 months, and only 20% of washed nets were retreated with insecticide. Most users of the insecticide tablets found them very effective in killing/repelling mosquitoes and other pests. |

[32] **NB to Victor or Hezron, I assume this is 2000, but the report doesn't say.**

| Year | Reference | Nature of Study | Implem.Organizations | Major Findings/Conclusions |
|---|---|---|---|---|
| **SURVEILLANCE/MONITORING AND EVALUATION** | | | | |
| 1999 | Manjrekar and Herman, 1999 | Assessment of sources and quality of mortality data for children under 5 | CDC and DHMT | • Bungoma District has well-established system for vital registration of births and deaths (estimated 60-70% of all deaths are reported). Potential sources of bias in mortality data were noted limiting usefulness of vital registration data to assess impact of BDMI interventions, but data may be useful in comparison with mortality rates from another district without BDMI inputs.<br>• Hospital surveillance data was not of sufficient completeness and quality for use in estimating child mortality and assessing BDMI impact. |
| 1999 | Ndwiga and Kamau, 1999 | Assessment of HMIS using random sample of 33 HFs | AMREF and DHMT | • Current HIS is poor and data are not reliable, and thus not useful for supporting management of health services.<br>• Most of information is used for planning, decisionmaking, and computing trends; information is less used for monitoring and evaluation of health activities.<br>• DHMT members lack training in data analysis and interpretation. Health personnel are not adequately trained in HMIS. |
| 2002 | Roper, 2002 | Analysis of vital registration data from 1994-2000 for Bungoma and Busia/Teso Districts | CDC | • Reporting of vital registration data is incomplete and appears to vary over time. Thus these data cannot be used for comparing intervention and control districts and for assessing changes in under-5 mortality over time. |

# Appendix 3. List of Indicators for BDMI Objectives (process, outcome and impact)

OBJECTIVE 1: IMPROVED CASE MANAGEMENT IN HEALTH FACILITIES 3/31/00

| Indicator (I=impact, O=outcome, P=process) | | Indicator values a = GOK b = non-GOK | | | Data source | Who collects | Frequency | Who analyses | Who uses |
|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Follow-up | Target | | | | | |
| 1 I | N: Number of hospitalized children<5 who die from malaria or anemia<br>---<br>D: Number of hospitalized children<who die from any cause | TBD | TBD | None* | Civil registra-tion | AM-REF and DHMT | Yearly | DHMT and CDC | DHMT |
| 2 O | N: Number of children <5 seen as outpatients with IMCI classification of very severe febrile disease who are correctly treated according to the IMCI guidelines and referred for hospitalization.<br>---<br>D: Number of children <5 seen as outpatients with the IMCI classification of very severe febrile disease. | '94[a] 13%<br>'99[b] 0% | '97[a] 15% | 80% | Health facility survey<br>Supervi-sion | DHMT | Baseline Mid-term End (survey) Conti-nuosly (supervi-sion) | DHMT and CDC | DHMT |
| 3 O | N: Number of children <5 seen as outpatients with IMCI classification of malaria who received an effective antimalarial drug<br>---<br>D: Number of children <5 seen as outpatients with IMCI classification of malaria | '94[a] 84%<br>'99[b] 61% | '97[a] 95% | 90% | Health facility survey<br>Supervi-sion | DHMT | As above | DHMT and CDC | DHMT |
| 4 O | N: Number of children <5 seen as outpatients with IMCI classification of anemia who are treated correctly according to the IMCI guidelines.<br>---<br>D: Number of children <5 seen as outpatients with IMCI classification of anemia | '94[a] 1%<br>'99[b] 0% | '97[a] 16% | 75% | Health facility survey<br>Supervi-sion | DHMT | As above | DHMT and CDC | DHMT |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5<br>O | N: Number of children <5 seen as outpatients without fever or anemia who are prescribed an antimalarial drug<br>---<br>D: Number of children <5 seen as outpatients without fever or anemia | '99[b] 32% | TBD | 10% | Health facility survey<br><br>Supervi-sion | DHMT | As above | DHMT and CDC | DHMT |
| 6<br>O | N: Number of outpatients <5 who are referred and taken to a referral facility<br>---<br>D: Number of outpatients <5 who are referred | TBD | TBD | 80% | Referral register and f/u. | DHMT | TBD | DHMT and CDC | DHMT |
| 7<br>P | N: Number of health care workers seeing sick children who have received IMCI training<br>---<br>D: Number of health care workers seeing sick children | TBD | TBD | 60% | Staffing and training records | DHMT (DCO/ DPHN) | Yearly | HIS | DHMT DHMB CAs |
| 8<br>P | N: Number of GOK health facilities where sick children are seen as outpatients that have received at least two IMCI supervisory visits in the last year<br>D: Number of GOK health facilities where sick children are seen as outpatients | 31% | TBD | 80% | Supervi-sory visit reports | DHMT | Yearly | HIS/ MRIO | DHMT DHMB CAs |

* No target has been set for this indicator because it is uncertain how it would change in a project in which the inpatient case management of malaria and anemia improve and the number of children referred for very severe febrile disease and severe anemia increases.

# APPENDIX 3

OBJECTIVE 2: IMPROVED CASE MANAGEMENT AT HOME/COMMUNITY 3/31/00

| Indicator (I=impact, O=outcome, P=process) | | Indicator values | | | Data source | Who collects | Frequency | Who analyses | Who uses |
|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Follow-up | Target | | | | | |
| 1 O | N: Number of children <5 with an episode of fever during the prior 2 weeks who were treated at home with an effective antimalarial drug or taken to a health facility<br>---<br>D: Number of children <5 with an episode of fever during the prior 2 weeks | '96 75% | TBD | 15% increase | House-hold survey | DHMT H/F team | Baseline Mid-term End | MRIO | DHMT DHMB CORPS MOH H/Q CAs |
| 2 O | N: Number of children <5 with an episode of fever during the prior 2 weeks who were treated at home with an effective antimalarial drug according to national policy or taken to a health facility by the 2nd day of fever<br>---<br>D: Number of children <5 with an episode of fever during the prior 2 weeks | '96 57% | TBD | 15% increase | House-hold survey | CORPS DHMT H/F team | Baseline Mid-term End | MRIO | DHMT DHMB CAs CORPS |
| 3 O | N: Number of trained antimalarial drug vendors who give correct advice on antimalarial drug and dosage when asked by "mystery shoppers" about the treatment of children with fever<br>---<br>D: Number of trained antimalarial drug vendors asked by "mystery shoppers" about the treatment of children with fever | TBD | TBD | At least 50% | Survey of drug vendors | CORPS DHMT | Yearly | MRIO CAs | DHMT DHMB CAs |
| 4 P | N: Number of caretakers of children <5 who have received at least one approved message on case management of febrile illness at home during the last year<br>---<br>D: Number of caretakers of children <5 | Not measured | TBD | At least 50% | House-hold survey | CORPS DHMT | Baseline Mid-project End | MRIO | DHMT DHMB R.H.F. COMMU-NITY CAs |

# APPENDIX 3

OBJECTIVE 3: IMPROVED MANAGEMENT OF MALARIA IN PREGNANCY 3/31/00

| | Indicator (I=impact, O=outcome, P=process) | Indicator values a = low-transmission season | | | Data source | Who collects | Frequency | Who analyses | Who uses |
|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Follow-up | Target | | | | | |
| 1 I | N: Number of primigravidas and segundagravidas with placental malaria delivering at sentinel health facilities<br>---<br>D: Number of primigravidas and segundagravidas | '98[a] 11% | TBD | 50% reduc-tion | Sentinel materni-ties (Bun-goma, Lugulu & Webuye) | DHMT HF | Twice yearly (May & Sept.) | DHMT/ CAs. | DHMT DHMB CAs |
| 2 I | N: Number of primigravidas and segundagravidas with HB < 11 g/dl<br>---<br>D: Number of primigravidas and segundagravidas | '98[a] 39% | TBD | 25% reduc-tion | ANC at sentinel materni-ties (Bun-goma, Lugulu & Webuye) | Lab staff at sentinel HFs | Twice yearly (May & Sept.) | DHMT CAs | DHMT DHMB Com-munity, CAs HCDC |
| 3 O | N: Women who delivered in the last 6 months and who took 2 doses of SP as intermittent presumptive treatment<br>---<br>D: Women who delivered in the last 6 months | Not measured | TBD | At least 50% | House-hold survey ANC reports | DHMT HFs | As above (survey) Quarterly (ANC reports) | DHMT CAs | DHMT DHMB CAs |
| 4 O | N: Number of mothers starting ANC early enough (during 2nd trimester) to receive 2 doses of SP<br>---<br>D: Number of mothers starting ANC | '98 48%* | TBD | 50% | House-hold survey ANC records | DHMT HFs | Quarterly | DHMT CAs | DHMT DHMB CAs |
| 5 O | N: Number of HFs with at least a 1-month supply of SP<br>---<br>D: Number of HFs | Not measured | TBD | TBD | TBD | TBD | TBD | TBD | TBD |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6 O | N: Number of ANC nurses who have received training in intermittent presumptive treatment<br>---<br>D: Number of ANC nurses | Not measured | TBD | TBD | TBD | TBD | TBD | TBD | TBD |

* This result is from the 1998 malaria in pregnancy study but does not appear in the report of the study. The result is based on the gestational age of determined for women making their first ANC visit at the ANC clinic sessions included in the study.

OBJECTIVE 4: USE OF INSECTICIDE-TREATED MATERIALS (ITMs) 3/31/00

| Indicator (I=impact, O=outcome, P=process) | | Indicator values | | | Data source | Who collects | Frequency | Who analyses | Who uses |
|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Follow-up | Target | | | | | |
| 1 O | N: Number of households where at least one mosquito net is owned and reportedly used<br>---<br>D: Number of households | '96 9% | TBD | 50% | Household survey | DHMT CAs | Baseline Mid-term End | DHMT CAs | DHMT CAs HCDC |
| 2 O | N: Number of children <5 whose usual sleeping site is covered by an impregnated bednet<br>---<br>D: Number of children <5 | '96 0% | TBD | 50% | Household survey | DHMT CAs | Baseline Mid-term End | DHMT CAs | DHMT CAs |
| 3 O | N: Number of mosquito nets reportedly impregnated or re-impregnated within appropriate time period, depending on insecticide<br>---<br>D: Number of mosquito nets | '96 0% | TBD | 50% | Household survey | DHMT CAs | Baseline Mid-term End | DHMT CAs | TBD |
| 4 O | N: Number of households that are within 10 km of a mosquito net distribution and insecticide re-impregnation site<br>---<br>D: Number of households | Not measured | TBD | 25% | Household survey | DHMT CAs | Baseline Mid-term End | DHMT CAs | DHMT CAs Commu-nity |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 P | N: Number of caretakers of children <5 who state they have heard at least 1 adequate message on ITMs (micro-teaching, baraza, or caretaker's instructions)<br>---<br>D: Number of caretakers of children <5 | Not measured | TBD | TBD | Household survey | DHMT CAs | Baseline Mid-term End | DHMT CAs | TBD |
| 6 P | N: National policies on tax exemption for mosquito nets and insecticides supportive of ITMs are in place | Not in place | TBD | In place | MOH regu-lations | DHMT | N/A | | DHMT MOH/ HQS DO-NORS |

OBJECTIVE 5: IMPROVED DATA COLLECTION FOR MONITORING AND PLANNING 3/31/00

| Indicator (I=impact, O=outcome, P=process) | | Indicator values | | | Data source | Who collects | Frequency | Who analyses | Who uses |
|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Follow-up | Target | | | | | |
| 1 I | Proportional change in under-5 mortality in Bungoma District minus the proportional change in under-5 mortality in Busia District | Pending | TBD | -15% by end of project | Death notification records Census | DHMT CAs | Mid-term End | DHMT CAs | DHMT DHMB CAs |
| 2 O | N: Number of health facilities that report accurately<br>---<br>D: Number of health facilities | 06% | TBD | 90% | District records | HRIO | Monthly, quarterly, annually | HRIO | DHMT CAs |
| 3 O | N: Number of health facilities receiving supervisory visit at least three times yearly (with feedback on reporting)<br>---<br>D: Number of health facilities | TBD | TBD | 80% | District supervisory schedule and reports | DHMT | Twice yearly | DHMT | DHMT CAs HCDC |
| 4 O | N: Supervisors complete analysis for case management indicators based on data gathered during their visits within 3 months after each 6-month period | TBD | TBD | All analy-ses done | Supervisors' reports | Super-visors | Twice yearly | Supervi-sors CAs | DHMT CAs |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5<br>O | N: Number of RFs that produce timely reports on morbidity/mortality<br>---<br>D: Number of RFs | 30% | TBD | 70% | DHMIS office | HRIO | Monthly | HRIO | DHMT<br>HF<br>MOH/ HQ |
| 6<br>O | N: Number of RFs that submitted reports consistent with registers<br>---<br>D: Number of RFs | TBD | TBD | 90% | Health facility report and registers | HRIO | Quarterly | HRIO | DHMT<br>HFS |
| 7<br>P | N: Number of DHMT members and health facility staff who write reports trained on revised DHMIS<br>---<br>D: Number of DHMT members and health facility staff who write reports | 7 (%?) | | 80% | DHMT records | DHMT | Monthly | DHMT | DHMT<br>CAs<br>HCDC |

## Appendix 4. Summary of BDMI-Supported Training of Government and Nongovernment Staff, 1998–2002

| Cadre of workers or staff trained | Staff trained on general malaria control | | Staff trained on IMCI case management | | Staff trained on general management and financial mgt. | |
|---|---|---|---|---|---|---|
| | Number trained | Percent trained | Number trained | Percent trained | Number trained | Percent trained |
| Medical officers | — | — | 2 | 17 | 3 | 25 |
| Clinical officers | 46 | 80 | 30 | 56 | — | — |
| Nurses | 85 | 85 | 62 | 37 | — | — |
| Laboratory staff | 30 | 100 | — | — | — | — |
| District Health Mgt Boards | 22 | 88 | — | — | 22 | 88 |
| Drug vendors | 126 | 84 | — | — | — | — |
| Organized community groups | 144 | 69 | — | — | 144 | 69 |
| Teachers | 27 | 90 | — | — | — | — |
| Chiefs/assistant chiefs | 140 | 90 | — | — | — | — |

In addition to the training activities included above, the Quality Assurance Project also sponsored a number of training activities.

In support of the team problemsolving intervention, QAP sponsored:

- Training of IMCI supervisors and selected DHMT members in problemsolving skills and setting up and coaching teams;
- Training of problemsolving teams in 13 health facilities;
- Refresher training in problemsolving for supervisors/coaches; and
- Refresher training for IMCI supervisors in how to assess IMCI performance.

In support of the vendor-to-vendor education program, the project sponsored:

- Training on malaria guidelines and vendor-to-vendor communication using job aids, for 73 wholesale counter attendants and mobile drug venders in new malaria guidelines;
- Refresher training of about 60 wholesale attendants/venders;
- Training of 35 new mobile drug vendors; and
- Training of eight mystery shoppers and four DHMT members (supervisors) to assess private drug outlets.

In support of jirani-kwa-jirani (neighbor-to-neighbor) activity in 150 villages, QAP sponsored:

- Training of 30 public health technicians in how to launch and monitor the activity.